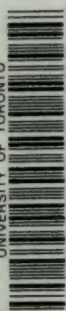
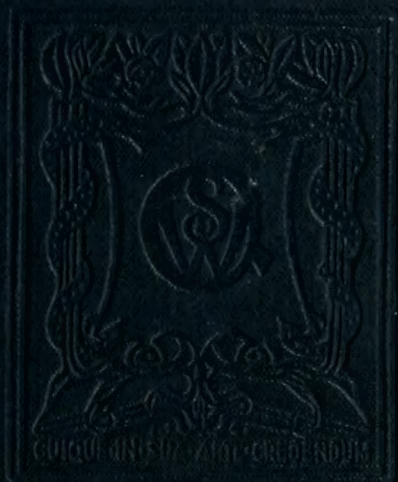


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Frederick W. Russell





GYNECOLOGICAL DIAGNOSIS  
AND PATHOLOGY

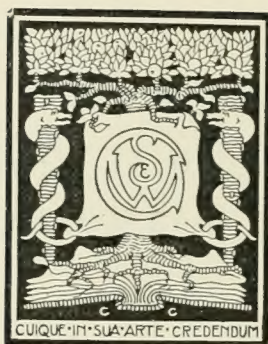






FIG. 1.



FIG. 2.



FIG. 3.

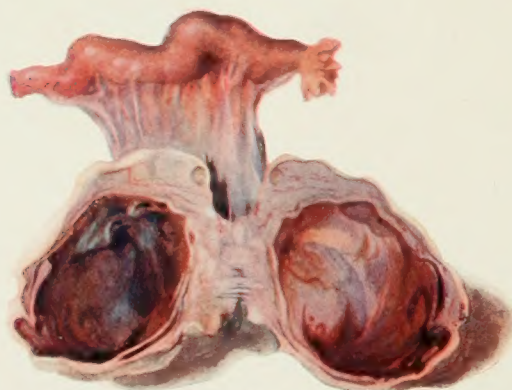


FIG. 4.

THE CYSTIC OVARY.

FIGS. 1, 2.—Follicular cysts. FIG. 3.—Lutein cyst. FIG. 4.—Blood cyst.



# GYNECOLOGICAL DIAGNOSIS AND PATHOLOGY

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WITH EIGHT PLATES AND 202 FIGURES

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## P R E F A C E

WE do not profess in the following pages to give a complete account of the various conditions that constitute Gynecological Pathology. Our object has been rather to furnish the student with a method of study.

Gynecological teaching has suffered in the past from the fact that the student has not been led to the study of actual specimens and the results of microscopic examination, on which alone Gynecological Diagnosis can be founded. Pathology in its relation to physical signs forms the basis.

We have described and figured, as far as possible, such specimens as have been examined by ourselves during the past five years. The drawings and photographs (the latter taken by Archibald Johnstone, of the University Gynecological Laboratory) may therefore be taken as typical of the material obtained in the course of ordinary Gynecological work.

We are indebted to Dr. W. Fordyce for some of the material and much valuable assistance in the preparation of this book.

A. H. F. BARBOUR.

B. P. WATSON.

EDINBURGH, *June* 1913.





# TABLE OF CONTENTS

	PAGE
Methods of Diagnosis . . . . .	3
HISTORY OF THE CASE . . . . .	3
Origin of disease . . . . .	4
Symptoms . . . . .	4
The Menstrual Function—disturbances of . . . . .	6
Reproductive Function—disturbances of . . . . .	7
PHYSICAL EXAMINATION . . . . .	7
Examination of the Abdomen . . . . .	7
Examination of the Pelvis . . . . .	11
Inspection of External Genitals . . . . .	11
Vaginal Examination . . . . .	11
Bimanual Examination . . . . .	14
Rectal and Recto-vaginal Examination . . . . .	20
The Speculum . . . . .	22
The Uterine Sound . . . . .	22
Dilatation of Cervix with Curettage . . . . .	25
Microscopic Examination of Tissues . . . . .	28
LABORATORY INVESTIGATION . . . . .	28
Bacteriological Examination . . . . .	28
Histological Examination . . . . .	30
The Pathological Conditions . . . . .	35
THE UTERUS—FORM, SIZE, AND POSITION . . . . .	35
Malformations . . . . .	38
Atrophy and Superinvolution . . . . .	39
Displacements . . . . .	40
Anteflexion . . . . .	43
Retroversion and Retroflexion . . . . .	45
Prolapse . . . . .	48
Inversion . . . . .	52
AFFECTIONS OF THE CERVIX . . . . .	53
Anatomy . . . . .	53
Laceration . . . . .	57
Cervical Catarrh . . . . .	59
Mucous Polypi . . . . .	65
Cancer . . . . .	65

THE PATHOLOGICAL CONDITIONS—*continued*

	PAGE
MUCOUS MEMBRANE OF THE BODY OF THE UTERUS . . .	77
Normal Histology . . . . .	77
Menstrual Changes in Mucous Membrane . . . . .	80
Changes in Mucous Membrane during Pregnancy . . . . .	82
"           "           "           after Menopause . . . . .	83
 PATHOLOGICAL CONDITIONS OF THE ENDOMETRIUM . . . . .	 84
Acute Inflammation (Acute Endometritis) . . . . .	84
Glandular Hyperplasia . . . . .	85
Fibrosis Uteri—Chronic Metritis . . . . .	89
Retention of Products of Conception . . . . .	93
Tubercle . . . . .	95
Carcinoma . . . . .	97
Chorionepithelioma—Deciduoma Malignum . . . . .	101
 FIBROID TUMOURS OF THE UTERUS . . . . .	 104
Sub-peritoneal, Interstitial, Sub-mucous . . . . .	105
Cervical . . . . .	111
Adeno-myoma . . . . .	111
Clinical Phenomena . . . . .	113
Degenerative Changes . . . . .	117
Atrophy . . . . .	117
Calcification . . . . .	118
Hyaline Degeneration . . . . .	118
Mucoid and Myxomatous Degeneration . . . . .	118
Cystic Degeneration . . . . .	119
Necrobiosis, or Red Degeneration . . . . .	120
Sarcomatous Degeneration . . . . .	121
 SARCOMA OF THE UTERUS . . . . .	 123
 AFFECTIONS OF THE FALLOPIAN TUBE . . . . .	 127
Anatomy and Histology . . . . .	127
Inflammation—Salpingitis . . . . .	129
Acute Salpingitis . . . . .	130
Tuberculous Salpingitis . . . . .	134
Tubal Gestation . . . . .	138
Causes . . . . .	139
Engratting of Ovum in Tube . . . . .	140
Changes in Tube and Uterus . . . . .	142
Progress and Results . . . . .	142
Clinical Phenomena . . . . .	146
 TUMOURS OF THE FALLOPIAN TUBE . . . . .	 149

# TABLE OF CONTENTS

ix

## THE PATHOLOGICAL CONDITIONS—continued

	PAGE
AFFECTIONS OF THE OVARY . . . . .	150
Anatomy and Physiology . . . . .	150
Physiology of the Ovary . . . . .	151
Prolapse of the Ovary . . . . .	152
Ovaritis . . . . .	152
The Cystic Ovary . . . . .	152
Ripening of the Follicle . . . . .	153
Formation of Corpus Luteum . . . . .	154
Pathology . . . . .	156
Clinical Phenomena . . . . .	158
The Cirrhotic Ovary . . . . .	159
Pathology . . . . .	159
Clinical Phenomena . . . . .	160
Multilocular Ovarian Cyst . . . . .	161
Papillomatous Ovarian Cyst . . . . .	163
Dermoid Ovarian Cyst . . . . .	164
Solid Ovarian Tumours . . . . .	166
Fibroma . . . . .	166
Sarcoma . . . . .	166
Carcinoma . . . . .	167
Clinical Phenomena of Ovarian Tumours . . . . .	169
Diagnosis . . . . .	169
Physical Signs of Small Intra-pelvic Tumour . . . . .	170
" " of Abdominal Ovarian Tumour . . . . .	170
Differential Diagnosis . . . . .	171
of Small Pelvic Tumours . . . . .	171
of Large Abdominal Tumour . . . . .	172
COMPLICATIONS OF OVARIAN CYSTS . . . . .	173
Torsion of Pedicle . . . . .	174
Rupture of Cyst . . . . .	175
Suppuration . . . . .	177
Malignant Change . . . . .	177
BROAD LIGAMENT CYSTS . . . . .	177
Parovarian Cyst . . . . .	177
Other Broad Ligament Cysts . . . . .	181
Origin of Ovarian and Broad Ligament Cysts . . . . .	181
AFFECTIONS OF THE PERITONEUM AND CELLULAR TISSUE . . . . .	182
Anatomy . . . . .	182
Pathological Changes in Inflammation . . . . .	183
Pelvic Peritonitis . . . . .	183
Tuberculous . . . . .	185
Malignant . . . . .	185
Pelvic Cellulitis . . . . .	187

THE PATHOLOGICAL CONDITIONS—*continued*

	PAGE
UTERO-SACRAL CELLULITIS . . . . .	189
PELVIC HÆMATOCELE . . . . .	190
AFFECTIONS OF THE VAGINA . . . . .	192
Anatomy and Physiology . . . . .	192
Malformations . . . . .	196
Atresia of Vagina and Hymen . . . . .	196
Displacement of Vaginal Walls Downwards . . . . .	197
Cystocele . . . . .	198
Rectocele . . . . .	198
Fistulæ . . . . .	198
Vesico-vaginal . . . . .	198
Recto-vaginal . . . . .	199
Vaginitis . . . . .	199
Vaginismus—Dyspareunia . . . . .	200
Tumours . . . . .	201
THE PELVIC FLOOR . . . . .	202
Anatomy . . . . .	202
Pathological Changes . . . . .	203
AFFECTIONS OF THE VULVA . . . . .	203
Anatomy . . . . .	203
Vulvitis . . . . .	206
Bartholinian Abscess . . . . .	207
Pruritus Vulvæ . . . . .	207
Kraurosis . . . . .	208
Leucoplakia . . . . .	208
Vulvar Warts . . . . .	209
Eruptions of the Vulva . . . . .	209
Ulcerative Lesions of the Vulva — Lupoid, Syphilitic,	
Tuberculous . . . . .	209
Elephantiasis . . . . .	211
Tumours . . . . .	211
Urethral Caruncle . . . . .	212



# LIST OF ILLUSTRATIONS

## COLOURED PLATES

### PLATES

I. The Cystic Ovary . . . . .	FRONTISPIECE	<i>for description see p.</i>	157
II. The Os Externum as seen in the Speculum . . . . .		<i>Facing p.</i>	54
III. Carcinoma of the Endometrium . . . . .		"	96
IV. Uterine Fibroid undergoing Necrobiosis or 'Red Degeneration' . . . . .		"	129
V. Tubal Gestation . . . . .		"	138
VI. Tubal Gestation . . . . .		"	147
VII. Multilocular Ovarian Cyst—'Ovarian Tumour' . . . . .		"	162
VIII. Dermoid Tumour of Ovary . . . . .		"	164

## FIGURES IN TEXT

FIG.	PAGE
1. Case of Ovarian Tumour . . . . .	8
2. Case of Uterine Fibroid . . . . .	9
3. Area of Dulness in an Ovarian Tumour (left fig.), contrasted with Ascites (right fig.) . . . . .	10
4. Position of Fingers in Vaginal Examination . . . . .	12
5. Diagram of Relation of Pelvis to Abdomen . . . . .	14
6. Vertical Mesial Section of Pelvis (Pirogoff) . . . . .	15
7. Section of Pelvis . . . . .	16
8. Uterus and its Appendages as seen through the Brim . . . . .	17
9. Position of Hands in Bimanual Examination . . . . .	18
10. Bimanual Examination, showing the Grasp of the Uterus Bimanually to estimate its Length . . . . .	19
11. Bimanual Examination . . . . .	19
12. Recto-Vaginal Examination . . . . .	21
13. Diagram contrasting Cellulitis and Peritonitis, as felt per Rectum . . . . .	21
14. Examination with the Speculum . . . . .	23
15. Passing the Sound, with the Uterus to the Front . . . . .	24
16. Bimanual Examination combined with the Sound (A. R. Simpson) . . . . .	25
17. Dilatation of the Cervix . . . . .	26
18. Examination of the Uterine Cavity with the Finger . . . . .	27
19. Diagnostic Curettage . . . . .	27
20. Gonococci in Pus Cells, and enlarged diagrammatically to show the shape of the Diplococci . . . . .	29
21. Uterus in Antero-Posterior and Coronal Section . . . . .	36
22. Measurements of Uterus . . . . .	37
23. Section of Pelvis with Distended Bladder (Pirogoff) . . . . .	37

FIG.	PAGE
24. Rudimentary Uterus (Veit) . . . . .	38
25. Uterus Bicornis . . . . .	38
26. Uterus removed from a patient aged 19 who had menstruated for two years with increasing pain, calling at last for Hysterectomy . . . . .	39
27. Infantile Uterus in Coronal Section . . . . .	39
28. Uterus and Ovaries from a Case of Superinvolution (Sir J. Y. Simpson) . . . . .	41
29. Conical Vaginal Portion with Pin-hole Os . . . . .	43
30. Antelexion with Stenosis of Os Externum (Winckel) . . . . .	43
31. Congenital Antelexion contrasted with Acquired, due to Utero-sacral Cellulitis . . . . .	44
32. Congenital Retroflexion (Ruge) . . . . .	45
33. Uterus Retroverted and Bound Back by Peritonitic Adhesions (Winckel) . . . . .	46
34. Diagnosis of Retroflexion by Bimanual Examination . . . . .	47
35. Complete Prolapse of the Uterus . . . . .	48
36. Section of the Specimen shown in Fig. 35 . . . . .	49
37. Complete Prolapse with Ulceration round the Os . . . . .	50
38. The Hernial Nature of Prolapsus Uteri (Berry Hart) . . . . .	51
39. Inversion of Uterus (Crosse) . . . . .	52
40. Section of Inverted Uterus removed by Supra-Vaginal Hysterectomy two months after Confinement . . . . .	53
41. Mucous Membrane of Vaginal Portion of Cervix (H.P.) . . . . .	54
42. Mucous Membrane of Cervix at Os Externum (L.P.) . . . . .	55
43. Mucous Membrane of Cervix at Os Externum (H.P.) . . . . .	55
44. Cervical Gland . . . . .	56
45. Hypertrophy of Vaginal Portion of Cervix . . . . .	57
46. Single Laceration (Emmet) . . . . .	58
47. Multiple or Stellate Laceration (Emmet) . . . . .	59
48. Cervical Erosion or Catarrhal Patch . . . . .	60
49. Vaginal Portion of Cervix—Papillary Erosion . . . . .	60
50. Erosion of the Cervix undergoing Cure . . . . .	61
51. Vaginal Aspect of Cervix—Nabothian Follicles . . . . .	61
52. Nabothian Follicle (H.P.) . . . . .	62
53. Cervix removed by Amputation, containing large Cysts resulting from Adenomatous Overgrowth of the Glands. . . . .	63
54. Uterus Laid Open, showing Mucous Polypi springing from the Cervix . . . . .	64
55. Mucous Polypus of Cervix (L.P.) . . . . .	64
56. Fibro-adenomatous Polypus of Cervix . . . . .	65
57. Cancer of the Cervix . . . . .	66
58. Squamous Epithelioma of the Cervix . . . . .	67
59. Uterus Laid Open to show Epithelioma of Anterior Lip . . . . .	68
60. Same in Section to show the Cauliflower-like Appearance of the Growth in this Case . . . . .	68
61. Columnar Cell Carcinoma of Cervix . . . . .	68
62. Columnar Cell Carcinoma of Cervix . . . . .	69
63. Adeno-Carcinoma of the Cervix . . . . .	69

# LIST OF ILLUSTRATIONS

xiii

FIG.	PAGE
64. Cancer of the Cervix . . . . .	70
65. Cancer of the Cervix . . . . .	70
66. Vertical Mesial Section of Pelvis . . . . .	70
67. Cancer of Cervix which has produced Vesico-Vaginal and Recto-Vaginal Fistulae (Farre) . . . . .	71
68. Lymphatics and Lymphatic Glands of Pelvis and Lower Part of Abdomen (Poirier) . . . . .	72
69. Kidneys and Ureters, from a Case of Cancer of Uterus with Uraemic Convulsions . . . . .	72
70. Table and Diagram showing frequency of Carcinoma according to age of Patient . . . . .	74
71. Transverse Section of Uterine Wall and Cavity . . . . .	77
72. Mucous Membrane of Uterus—Surface Layer . . . . .	78
73. Mucous Membrane of Uterus—Deep Layer . . . . .	78
74. Mucous Membrane of Uterus; High-power View of Stroma and Glands . . . . .	79
75. Mucous Membrane of Uterus just before Menstruation . . . . .	80
76. Mucous Membrane of Uterus, First Day of Menstruation . . . . .	81
77. Mucous Membrane of Uterus, Second Day of Menstruation . . . . .	81
78. Decidua (L.P.) . . . . .	83
79. Decidual Cells (H.P.) . . . . .	83
80. Glandular Endometritis . . . . .	85
81. Glandular Endometritis . . . . .	86
82. Glandular Endometritis . . . . .	86
83. Hæmorrhagic Endometritis . . . . .	87
84. Uterus with 'Villous Endometritis' . . . . .	88
85. Fibrosis Uteri. . . . .	89
86. Section of the Mucous Membrane from a Case of Fibrosis Uteri, with Profuse Hæmorrhage . . . . .	90
87. Vessel of Middle Third of Muscular Wall, from same Case as Fig. 86 . . . . .	90
88. Section of Mucosa from a Case of Interstitial Endometritis or Fibrosis Uteri . . . . .	91
89. Scraping from Case of Incomplete Abortion . . . . .	93
90. Scraping from Case of Incomplete Abortion . . . . .	94
91. Tissue removed by Curette from a Case of Tuberculous Endometritis . . . . .	95
92. Tubercle of Endometrium . . . . .	95
93. Cancer of the Body of the Uterus . . . . .	97
94. Cancer of the Body of the Uterus . . . . .	97
95. Adeno-Carcinoma of the Endometrium (L.P.) . . . . .	98
96. Adeno-Carcinoma of Endometrium (H.P.) . . . . .	98
97. Malignant Adenoma of Endometrium . . . . .	100
98. Malignant Adenoma of Endometrium . . . . .	100
99. Chorionepithelioma of the Uterus . . . . .	102
100. Chorionepithelioma of the Uterus (L.P.) . . . . .	103
101. Chorionepithelioma of the Uterus . . . . .	103
102. Interstitial Fibroid Tumour of the Uterus. . . . .	105

FIG.	PAGE
103. Uterus with Multiple Sub-peritoneal Fibroids . . . . .	106
104. Uterus with Sub-peritoneal Fibroid . . . . .	106
105. Uterus with Interstitial and Sub-peritoneal Fibroids . . . . .	107
106. Sub-mucous Fibroid Tumour of the Uterus . . . . .	107
107. Sub-mucous Fibroid Tumour of the Uterus . . . . .	109
108. Fibrous Polypus of the Uterus . . . . .	109
109. Uterus with Multiple Fibroids . . . . .	110
110. Microscopic Section of Uterine Fibroid . . . . .	110
111. Cervical Fibroid . . . . .	111
112. Adeno-myoma of the Uterus . . . . .	112
113. Adeno-myoma of the Uterus . . . . .	112
114. Adeno-myoma of the Uterus . . . . .	113
115. Table and Diagram showing frequency of Fibroid Tumours according to age of Patient . . . . .	115
116. Uterine Fibroid—Hyaline Degeneration . . . . .	118
117. Uterine Fibroid with Cystic Degeneration . . . . .	119
118. Uterine Fibroid—Cystic Degeneration . . . . .	119
119. Telangiectatic Fibroid . . . . .	120
120. Uterine Fibroid—undergoing Red Degeneration . . . . .	121
121. Uterine Fibroid—Sarcomatous Degeneration . . . . .	122
122. Sarcoma of Uterus . . . . .	123
123. Sarcoma of Uterus . . . . .	124
124. Perithelioma of Uterus . . . . .	125
125. Perithelioma of Uterus . . . . .	125
126. Perithelioma of Uterus . . . . .	126
127. View from behind of the Lateral Angle of the Uterus, with part of the Left Broad Ligament, Fallopian Tube, Ovary and Parovarium (Henle)	127
128. Transverse Section of Uterine End of Tube . . . . .	128
129. Transverse Section of Ampulla of Tube . . . . .	129
130. Salpingitis . . . . .	130
131. Salpingitis . . . . .	131
132. Salpingitis . . . . .	131
133. Wall of Pyosalpinx . . . . .	132
134. Pyosalpinx . . . . .	133
135. Tuberculous Tube . . . . .	135
136. Tubal Tuberculous Pyosalpinx removed along with the Uterus . . . . .	135
137. Section of Mucosa from Tuberculous Tube . . . . .	136
138. Uterine End of Tuberculous Tube . . . . .	137
139. Tubal Pregnancy . . . . .	140
140. Chorionic Villi from Case of Tubal Pregnancy (L.P.) . . . . .	141
141. Chorionic Villi from Case of Tubal Pregnancy (H.P.) . . . . .	141
142. Uterus from a Case of Tubal Pregnancy . . . . .	142
143. Tubal Mole . . . . .	143
144. Tubal Pregnancy . . . . .	144
145. Tubal Pregnancy . . . . .	145

FIG.	PAGE
146. Wall and Contents of a Hemato-salpinx . . . . .	148
147. Papillomatous Tumour of Tube . . . . .	149
148. Microscopic Section of Papilloma of Tube in Fig. 147, showing Branching Character of Growth . . . . .	150
149. Surface of Ovary . . . . .	151
150. Surface of Ovary, showing Primitive Follicles . . . . .	152
151. Ovary: Ripening Follicle . . . . .	153
152. Ovary: Ripe Follicle . . . . .	154
153. Ripe Follicles (H.P.), showing the Ovum in the Discus Proligerus . . . . .	154
154. Wall of Corpus Luteum . . . . .	155
155. Ovary: Corpus Albicans . . . . .	155
156. Cystic Ovary . . . . .	156
157. Surface of Cystic Ovary . . . . .	157
158. Cystic Ovary: Wall of Cyst . . . . .	158
159. Compound Cystic Ovarian Tumour . . . . .	161
160. Compound Cystic Ovarian Tumour . . . . .	163
161. Papillomatous Ovarian Cyst . . . . .	164
162. Dermoid Tumour of the Ovary . . . . .	165
163. Fibroma of the Ovary . . . . .	166
164. Endothelioma of both Ovaries, removed by Abdominal Section . . . . .	167
165. Microscopic Section of Endothelioma of Ovary . . . . .	168
166. Malignant Ovarian Tumour . . . . .	168
167. Ovarian Cyst with Twisted Pedicle . . . . .	174
168. Section of Broad Ligament showing Parovarian Tubules . . . . .	178
169. A Simple Broad Ligament Parovarian Cyst (Doran) . . . . .	178
170. Parovarian Cyst showing Ovary below, and Tube stretched on the Cyst, above . . . . .	179
171. Dilated Tube simulating Broad Ligament (Parovarian) Cyst . . . . .	179
172. Parovarian Cyst with Twisted Pedicle . . . . .	180
173. Diagram showing Origin of Tumours arising from and near the Ovary . . . . .	181
174. Coronal Section of Pelvis—Diagrammatic . . . . .	184
175. Vertical Section of the Broad Ligament and Pelvic Cellular Tissue along the Line BB in Fig. 174 (after Freund) . . . . .	185
176. Horizontal Section through the Line AA in Fig. 174 . . . . .	185
177. Peritonic Adhesions drawing the Uterus to one side (Heitzmann) . . . . .	186
178. Peritoneal Bands binding down the Uterus, Tubes and Ovaries—result of chronic pelvic peritonitis (Heitzmann) . . . . .	186
179. Peritonic Effusion distending Pouch of Douglas . . . . .	187
180. Cellulitis in the Left Broad Ligament, extending upwards into the Iliac Fossa . . . . .	188
181. Cellulitis lower down in the Pelvis, which has extended forwards between the Uterus and Bladder and surrounds the latter . . . . .	189
182. Section of Pelvis showing displacement produced by Utero-sacral Cellulitis (Berry Hart) . . . . .	190
183. Extra-uterine Gestation . . . . .	191

FIG.	PAGE
184. A. Section of Vagina passing through Lateral Fornix ; and B. Section of Upper Third passing through the Cervix (natural size) (Hart)	193
185. Pelvic Floor in Cross Section (Henle)	194
186. Anterior Vaginal Wall and Multiparous Cervix looked at from behind (natural size) (Henle)	194
187. Vaginal Mucous Membrane	195
188. Atresia of Hymen (Schroeder)	196
189. Atresia of Vagina (Schroeder)	196
190. Rectocele (Schroeder)	198
191. Diagram representing the Chief Varieties of Urinary Fistulæ	199
192. The Sacral or Supporting Segment of the Pelvic Floor (Hart)	202
193. Vulvar Orifice in Virgin	204
194. Same in Married Nullipara, and Multipara	204
195. Complete Tear of Perineum	205
196. Recto-vaginal Tear	205
197. Abscess of the Bartholinian Gland	207
198. 'Venereal' Wart	210
199. Ulcus Serpiginosum of Vulva	210
200. Cancer of the Vulva	211
201. Urethral Caruncle	212
202. Microscopic Section of Same	212

I  
METHODS OF DIAGNOSIS





## METHODS OF DIAGNOSIS

IN Gynecology, as in Medicine and Surgery, it is necessary in order to make a diagnosis to carry out a systematic investigation of each case. In doing so a definite method of case-taking must be followed, otherwise important facts may be overlooked.

We obtain the information on which to form a diagnosis in two ways, by questioning the patient or her friends as to the history of the present attack and of any previous illness, and by making a physical examination. In this way we learn first the symptoms and then the physical signs, and from these a diagnosis can in most cases be made. Sometimes it is necessary to supplement clinical examination by laboratory investigation of pathological material obtained during the course of the examination or on operating. A gonococcal infection, for instance, can only be diagnosed accurately by examination of stained films of pus. In cancer of the body of the uterus, the diagnosis is usually made after microscopic examination of tissue removed by the curette. The character of a pelvic tumour removed at operation may not be settled until the growth has been microscopically examined. Pathological investigation thus plays an important part in gynecological diagnosis and, when not absolutely necessary from a diagnostic point of view, ought to be used systematically to supplement information obtained by ordinary clinical methods. By doing this we not only aid diagnosis but form a truer estimate of the significance of the various clinical phenomena. Pathology must always be the basis of diagnosis.

In describing the systematic examination of gynecological cases we have therefore to consider first the *history*, then *physical examination*, and lastly *laboratory investigation*.

### HISTORY OF THE CASE.

The student will not have taken the history of many gynecological cases before he finds that there is a certain sameness about them all. The same symptoms are present in different diseases, and the same pathological conditions may in two patients have a different train of symptoms. Rarely are symptoms pathognomonic, but this is no reason why a careful history should not be taken, and in certain conditions it

may prove of great value. In the rupture of an early tubal pregnancy, for instance, the physical signs may not be well marked, and a diagnosis is formed chiefly from the cessation of menstruation followed by acute abdominal pain, faintness and collapse. Again, irregular vaginal hæmorrhage occurring after the menopause at once suggests cancer of the uterus, and this possibility calls for a thorough investigation of the case.

The history takes cognisance of the origin of disease as well as of its symptoms and the disturbance of normal functions.

**Origin.**—Most gynecological diseases are chronic in nature, and in ascertaining the history it may be necessary to go back several months or years. The patient is apt to begin her story at some recent acute phase and, unless questioned closely, will omit the real beginning of her trouble. Traced back to its origin, her complaint will often be found to be related to one of four events in sexual life: puberty, marriage, conception or childbirth, and the menopause. With regard to the relative importance of these as a factor, the analysis of 2000 hospital cases in the University Gynecological ward of the Royal Infirmary, Edinburgh, shows that in nearly 50 per cent. the complaint was referred directly or indirectly to conception or childbirth; in 9 per cent. to the onset of the menstrual function at puberty; in 7 per cent. to the patients' entering married life; while 20 per cent. of the patients began to suffer later in life, towards the period of the menopause or change of life. Such an analysis does not account for all the cases, some pathological conditions, *e.g.* certain tumours, having no definite relation to any one of the four events.

**Symptoms.**—The three outstanding symptoms are pain, hæmorrhage and other vaginal discharges.

As regards *pain*, we inquire into its seat, character and amount.

The seat of the pain is often difficult to localise. It is described vaguely as being over the lower part of the abdomen or in the pelvis or as a bearing-down sensation. Sometimes it is of a 'referred' character. It is referred to the back or lower down over the sacrum in uterine lesions, and in lesions of the appendages to the corresponding iliac region. In cancer, it radiates beyond the pelvis, down the back of the thighs.

As to its character, pain may be periodic or more or less constant. The former is frequent in women, due to the monthly period, and will be referred to under Dysmenorrhœa. More or less constant pain may be found to be increased on exertion; or especially associated with such physiological functions as urination, defæcation, or sexual intercourse. Sometimes pain comes on without any assignable cause as in cancer; and may be worse at night, probably because then the patient notices it more. Further, it must be borne in mind that pain, apparently due to a pelvic cause, may on further examination be traced to some condition

outside of the pelvis. Thus, pain in the lower part of the abdomen may be due not to inflamed appendages, but to inflammation of the appendix or to a movable kidney.

The amount of pain is difficult to estimate. The personal equation has to be studied, whether we are dealing with a patient who is in good health or run down, and especially with one who will make little or much of her suffering. This has a bearing on the question of the necessity of making a vaginal examination in the case of unmarried women, which is justifiable only when symptoms are well-marked, and especially on the desirability of any operation for the relief of pain. In the case of those who have to work for their living, the number of days they are off work gives some indication, but in the case of better-class patients this test cannot be applied.

In dealing with *hæmorrhage*, the origin, character and amount of the bleeding must be inquired into.

As to its origin or cause, hæmorrhage is, during the child-bearing period, related most frequently to a previous childbirth or miscarriage. It may come on immediately after it, or show itself later as menorrhagia, the connecting pathological link being an endometritis. Hence in all cases of hæmorrhage, we inquire whether the patient had missed a period before it started. A patient may not recognise an early miscarriage, but always notices when her period has been absent.

The character of the bleeding is usually a profuse loss at the period—menorrhagia, more rarely a bleeding between the periods—metrorrhagia. The latter is more suggestive of a tumour, *e.g.* cancer or fibroid, than of endometritis.

As to the amount, a patient can generally tell whether she is losing more than usual, and the number of napkins used is an indication. The most important test is its effect on her health, that is, the amount of anæmia produced. In cases of profuse hæmorrhage at the period, the condition of the patient after the period is over is the best guide as to the amount of loss.

Of *vaginal discharges*, leucorrhœa is the term applied to the white discharge which occurs between the menstrual periods. In healthy conditions the amount is insignificant, but in catarrhal affections of the uterus, cervix and vagina it is increased so as to attract the patient's attention. In catarrhal affections of the uterus it is thin in character, but thick and tenacious in catarrh of the cervix. We ask whether it is muco-purulent, has suddenly developed with urinary symptoms as in gonorrhœa, or has a bad odour as in cancer.

In addition to these three chief symptoms, those due to disturbances of other systems have to be considered. The presence of urinary symptoms, such as frequent or painful micturition, points to cystitis, often associated with uterine lesions. Similarly with regard to the intestinal

functions, it will often be found that there is chronic constipation, which is an important factor in gynecological conditions. Further, any symptoms on the part of the circulatory, respiratory, digestive or nervous systems must also be recorded.

**The Menstrual Function.**—Having in this way obtained a general history of the patient's symptoms, a more careful and systematic investigation of the menstrual function must be made. As this varies with the individual, a note has to be made of the normal menstrual type and habit. We find out the age at which the function began; whether it was regular—of the 28-day, 30-day, or 21-day type—or irregular; and the duration of the period, which is usually three or four days. The report on a case might run thus: 'Menstruation began at 14, is of the 28-day type, and lasts three or four days'. We thus fix the normal habit of the individual so as to judge of the abnormal; and we ascertain this most easily by finding out what it was before marriage, or any other cause likely to disturb it. Having ascertained the normal, a note of the abnormal is made under one of three heads,—*Amenorrhœa*, *Menorrhagia*, or *Dysmenorrhœa*.

*Amenorrhœa* means cessation of menstruation, and the term is also used to include cases where the amount is diminished or the intervals prolonged. It may be physiological, as during pregnancy and lactation and after the menopause; or pathological, due to a general condition—*anæmia*, or to a local lesion—atrophy of the uterus from *superinvolution*. Under this heading the report might be: 'For the past twelve months the flow has lasted only one day instead of three or four as formerly', pointing to a constitutional condition or possibly atrophy of the uterus. Or, 'Menstruation has been entirely absent for four months', which in a married woman suggests pregnancy.

*Menorrhagia* covers cases in which the flow comes too frequently, lasts too long, or is profuse. The most frequent cause in married women is a pathological condition developing after childbirth or abortion, and the first question asked is whether it was preceded by *amenorrhœa*. Here the note might run, 'Since a miscarriage the patient has been unwell every three weeks, the period lasting for a week or ten days', suggesting *endometritis* after abortion. In other cases it develops gradually: in a uterine fibroid the increase may be spread over many years, the period being gradually prolonged till hæmorrhage is almost continuous.

*Dysmenorrhœa* covers cases in which menstruation is accompanied by pain, though it is difficult to say when the discomfort which often accompanies this function passes into actual pain. As regards the pain, we inquire whether it goes back to puberty as in congenital cases; whether it is present before the period as in inflammation of the appendages, or during it: whether it necessitates lying down for an hour or two, or is so severe as to interfere with work. In cases of *dysmenor-*



rhea going back to puberty, it must be borne in mind that there are two factors entering into the production of pain, namely, the peripheral stimulus and the condition of the central nervous system. Sometimes a local lesion is present, but frequently nothing is found in the pelvis and the cause of the patient's suffering has to be sought in the condition of her central nervous system—what might be described as inability to bear pain. This has an important bearing on the line of treatment to be adopted. If no sufficient local cause is found, the patient must be educated to disregard her suffering, to make as little of it as possible.

**Reproductive Function.**—Passing from the function of menstruation to that of reproduction, we have already referred to the significance of this from an etiological standpoint. Hence the importance of recording the duration of the child-bearing period and the number of children. The duration is ascertained most rapidly by asking the ages of the oldest and youngest child, and whether the patient has had a miscarriage since the last baby. If abortions have been frequent, the number of these and the period of gestation at which they occurred are of importance, especially in the diagnosis of specific disease.

Further, the character of the labour and the care taken during the puerperium have an important bearing on the etiology of pelvic inflammation. The statement under this head might run thus: 'Labours were normal except the last, when forceps was required'. The character of the puerperium is learned most quickly by ascertaining the day on which the patient is in the habit of getting up, and any deviation from that. For example, 'Patient usually rises on the tenth day, but after her last confinement lay for three weeks, the discharge being coloured during the whole period',—pointing to something retained after labour, which affected the involution of the uterus. Or, 'Patient rose on the tenth day as usual, but had to go back to bed again on account of pelvic pain',—pointing to the presence of pelvic inflammation arising at the confinement but not showing itself till later.

## PHYSICAL EXAMINATION.

Proceeding now to physical examination, the Gynecologist is concerned primarily with the local conditions in the pelvis, but it may be conveniently noted here that this must be supplemented by a careful examination of the other systems, circulatory, digestive, nervous and urinary, as the conditions found in them may materially affect both prognosis and line of treatment.

### EXAMINATION OF THE ABDOMEN.

Examination of the abdomen is a necessary preliminary to that of the pelvis for these three reasons: (1) All the pelvic organs, from the

obliquity of the brim of the pelvis (see fig. 5), lie underneath the lowest areas of the abdominal wall—hypogastric, right and left iliac; (2) pelvic tumours, and exudations of any size, may come to be abdominal in position; (3) examination of the abdomen may reveal an abdominal condition as the reason for symptoms which at first sight suggest a pelvic cause. For example, right-sided pain suggesting inflammation of the appendages may be found to be due to inflammation of the appendix or to a floating kidney.

To make a complete examination of the abdomen it is necessary that the whole abdominal surface be exposed. The patient should lie on



FIG. 1.—CASE OF OVARIAN TUMOUR.

Note the gradual slope of the abdominal contour, as seen from the side, towards the sternum.

her back and be covered with a sheet. Underneath this the loosened garments are drawn up, and then the sheet is turned down to just above the pubes. The examination should be made by inspection, palpation, percussion and auscultation.

On *inspection*, we note the general configuration of the abdomen. Normally the surface is flattened, with a slight elevation in the region of and below the umbilicus. When any abnormal projection is present its appearance as seen from the side may be significant: an ovarian tumour (fig. 1) and the pregnant uterus showing a less abrupt contour than a uterine fibroid (fig. 2).



Free fluid causes a bulging in the flanks, but if it is present in large amount the whole abdomen becomes distended and the umbilicus flattened. Note should be taken of the mobility of the abdominal walls with respiration, as restricted mobility over any area often indicates a localised peritonitis. The presence of striae and of the linea nigra is of significance as an evidence of pregnancy. Enlarged veins may indicate obstruction to the circulation in the liver or in the inferior vena cava and its tributaries.

*Palpation* is carried out with the patient lying on her back with her knees drawn up, and she is instructed to take deep respirations,

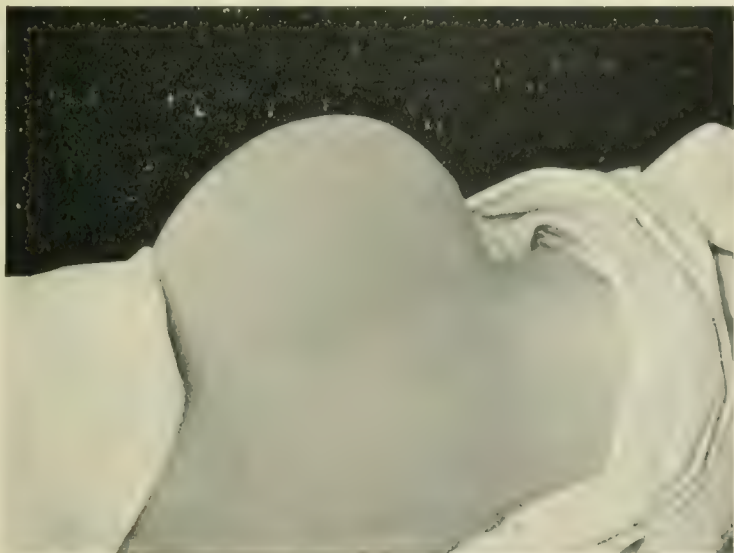


FIG. 2.—CASE OF UTERINE FIBROID.

Note the more rapid fall of the abdominal contour towards the sternum.

allowing the abdominal wall to move freely. The hands of the examiner should be warm, and scrupulously clean. Both hands are applied to the abdominal surface, the whole palmar aspect being in contact with the skin. If any area of tenderness or pain is present, that area should in the first instance be avoided and only touched after the hands have, as it were, got the confidence of the patient's muscles. Any tumour present is outlined with the two hands, and in doing so care must be taken not to push the tips of the fingers deeply into the abdominal wall. In order to determine whether a tumour is pelvic or abdominal in origin, try to pass the ulnar border of the hand between it and the pelvic brim. If this is impossible the tumour is probably pelvic in origin and

*vice versa*. The consistence of the swelling should be noted, whether firm, as in the case of a fibroid; semi-fluctuating, as in a pregnancy or ovarian tumour; or distinctly fluctuating, as in encysted fluid or a distended bladder. Where free fluid is present, fluctuation can be elicited between the two flanks and a fluid thrill projected across the abdominal cavity. Pain produced on palpation is noted; and in this connection it is important to remember that there are certain areas of hyperaesthesia associated with lesions of the different pelvic organs. In such areas the tenderness is usually superficial, and is always most marked in neurotic and hysterical patients. In the latter class of patient, it must be kept in mind that there may be sensitive areas in the skin without any lesion of deeper structures.

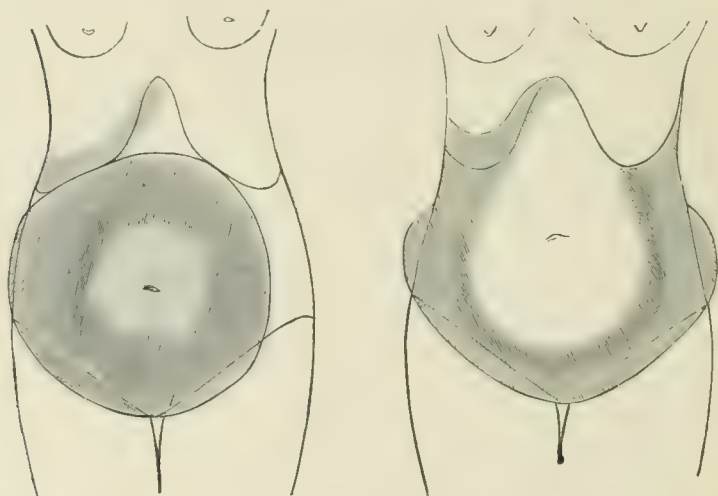


FIG. 3.—AREA OF DULNESS IN AN OVARIAN TUMOUR (left fig.),  
CONTRASTED WITH ASCITES (right fig.).

The shaded portion shows the dull area.

Where pain is complained of in the flank, it may be necessary to palpate the renal region to determine the presence of enlargement or excessive mobility of the kidney. The best way to palpate the kidney is as follows. In the case of the left kidney, the examiner, standing to the patient's right, passes his left hand underneath her back so as to place the finger-tips in the left lumbar region. The right hand is placed over the corresponding area anteriorly. In palpating the right kidney, the process is reversed. Then when the patient takes a deep breath, the kidney can be felt between the hands and its size and mobility ascertained.

By *percussion* we determine whether abdominal distension is due to dilated intestine or to a tumour. Practically all pelvic tumours, such

as ovarians and fibroids, come into contact with the anterior abdominal wall as soon as they have risen completely out of the pelvis. The percussion note over such tumours is therefore always dull, the flanks and epigastrium remaining tympanitic. If a pelvic tumour arises from the retro-peritoneal tissue it will not reach the anterior surface on becoming abdominal, and such a tumour gives a tympanitic note over it; just as a renal tumour gives a tympanitic note, due to the presence of the colon. If there is free fluid in the abdomen a dull note is got in the flanks, a tympanitic note in the centre (fig. 3). On changing the patient's position the areas of tympanitis and dullness alter.

Abdominal *auscultation* is important in certain cases. When the uterus rises into the abdomen and carries with it the broad ligaments, as in pregnancy and some interstitial fibroids, a blowing murmur known as the uterine soufflé can be heard over its margins. This soufflé is produced in the large vessels entering the side of the uterus from the broad ligament, and when timed it is found to be synchronous with the patient's pulse. It is practically diagnostic of uterine enlargement. In the diagnosis of pregnancy the foetal heart sounds are of the utmost importance.

#### EXAMINATION OF THE PELVIS.

Examination of the pelvis may be considered under the following heads:—

1. Inspection of the external genitals.
2. Vaginal examination.
3. Bimanual examination.
4. Rectal and recto-vaginal examination.
5. The Speculum.
6. The Sound.
7. Dilatation of the cervix with curettage.
8. Microscopic examination of the tissue removed by the curette and of vaginal or urethral discharges.

1. **Inspection of the external genitals** is only called for where the patient complains of pain, of a swelling at the orifice, or of something coming down; where there is local tenderness; or where syphilis or gonorrhoea is suspected. Inspection may reveal a labial abscess or new growth, *e.g.* urethral caruncle; a tear of the perineum; prolapsed pelvic organs; a purulent discharge, or local sores.

2. **Vaginal examination** should not be made on young girls unless the symptoms are urgent and the consent of the parent or guardian, who should be present at the examination, has been obtained. Even in the case of unmarried women it should not be performed if the required information can be obtained otherwise. Often examination per rectum will be sufficient.

The hands should be scrupulously clean and warm, and the index and

middle fingers of the right hand lubricated with carbolised vaseline. Soap does equally well as a lubricant, is always to hand, and more easily washed off. The patient lies on her left side or, as the vaginal examination is only a preliminary to the bimanual, on her back with the knees drawn up and separated. The left hand is used to clear away the clothes from the hips, while the fingers of the right are passed over the labia into the vaginal orifice, care being taken to avoid contamination from the anus. When possible the index and middle fingers are introduced (fig. 4), unless this causes pain, when the index alone may be used. Note the condition of the orifice, whether parous or nulliparous, whether there is

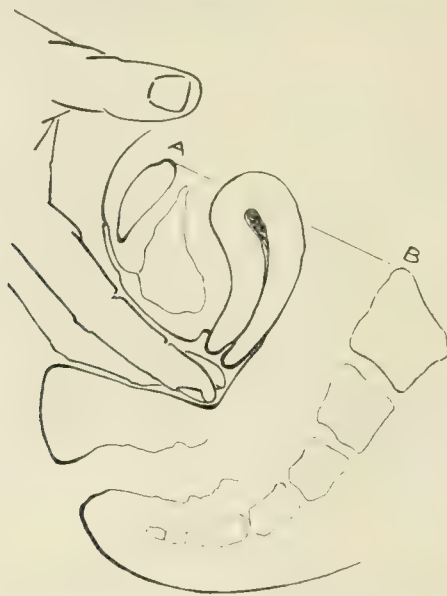


FIG. 4.—POSITION OF FINGERS IN VAGINAL EXAMINATION.

Note that the direction of the Vagina is parallel to the conjugate of the Brim—AB.

any tear of the perineum or if there is any excessive tenderness. In the vaginal cavity the character of the walls is noted, whether rugose as in nulliparæ or smooth as in multiparæ; whether the walls are firm, or lax and bulging as in prolapse; whether there is any excessive secretion as in catarrhal conditions. The fingers are then passed onwards to the vaginal roof and the condition of the cervix is noted. (1) Its direction: whether the external os is directed downwards and backwards as in the normal anteverted uterus, downwards and forwards as in retroversion, or whether it lies low down in the vagina as in prolapse. (2) The condition of the external os: whether feeling like a dimple as in nulliparæ, or trans-

versely elongated and irregular as in multiparae; whether velvety or granular as in cervical catarrh, or hard and friable as in cancer. (3) The consistence of the cervix: whether soft as in pregnancy, or abnormally hard with shotty projections on the surface (Nabothian follicles) as in chronic cervical catarrh. Further, there may project through the os polypi or fragments of abortion.

The vaginal roof surrounding the cervix is next investigated, the fingers being passed first into the anterior fornix, then into the posterior fornix, and lastly into the lateral fornices; and in these regions note is taken of any resistance or tenderness. Through the anterior fornix the body of the normal uterus can be felt, the other fornices ought to show nothing. The various pathological conditions which may be felt through them are given in the following table. In it they are grouped round the organ or tissue to which they are related.

**CONDITIONS FOUND IN THE FORNICES**

*On Vaginal and Bimanual Examination.*

**Anterior.**

BLADDER . . . . .	{ distended, tumour, calculus.
PERITONEAL CAVITY . . . . .	{ uterus, } fibroid, } peritonitis.
CELLULAR TISSUE . . . . .	cellulitis.

**Posterior.**

RECTUM. . . . .	{ faeces, tumour.
PERITONEAL CAVITY . . . . .	{ peritonitis, } hematocele, } carcinoma, } retroflexed uterus, } " gravid uterus, } fibroid of posterior wall, } prolapsed ovary, } ovarian tumour (small), } distended Fallopian tube, } extra-uterine gestation.
CELLULAR TISSUE . . . . .	{ cellulitis—utero-sacral, blood effusions.

**Lateral.**

PERITONEAL CAVITY . . . . .	{ peritonitis, } lateriflexed uterus, } fibroid, } enlarged ovary, } ovarian tumour, } parovarian tumour, } distended Fallopian tube.
CELLULAR TISSUE . . . . .	{ cellulitis of Broad Ligament, hematoma of Broad Ligament.

3. **The Bimanual examination** is the all-important one, in fact it is not too much to say that the vaginal examination is made in order that it may be supplemented by the bimanual. The various conditions tabulated under the vaginal examination can only be fully made out by means of the bimanual.

To understand this method of examination the following anatomical points must be borne in mind. Fig. 5 shows that the promontory of the sacrum stands some  $3\frac{1}{2}$  inches above the symphysis, its position depending on the length of the conjugate and the pitch of the brim. By 'pitch of

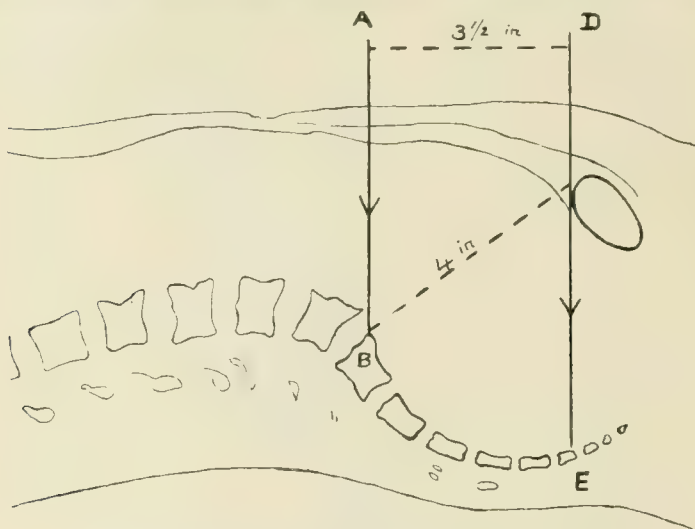


FIG. 5.—DIAGRAM OF RELATION OF PELVIS TO ABDOMEN,

Based on a Vertical Mesial Section with the Inclination of the Brim most frequently found in Frozen Sections, the body being in the dorsal posture. The perpendicular (AB) let fall on the promontory is  $3\frac{1}{2}$  inches above the upper edge of the symphysis with a conjugate of 4 inches. A perpendicular (DE) passing through the upper edge of the symphysis falls on the first coccygeal vertebra, the whole sacrum standing above this level.

the brim' we mean the angle which the conjugate makes with a perpendicular (DE) falling through the upper edge of the symphysis. This is due to the set of the pelvis in the body, and a study of frozen sections shows that this angle varies in normal pelves and thus differs from 'inclination' due to posture. Also we note in fig. 5 that the lower end of the sacrum is above the upper margin of the pubes. Thus the pelvic contents come to lie under the hypogastric area of the abdomen, *e.g.*, the uterus, which is a pelvic organ, lies in this region.

The structures felt between the hands on bimanual examination will be evident from the frozen section given in fig. 6. The great value of a



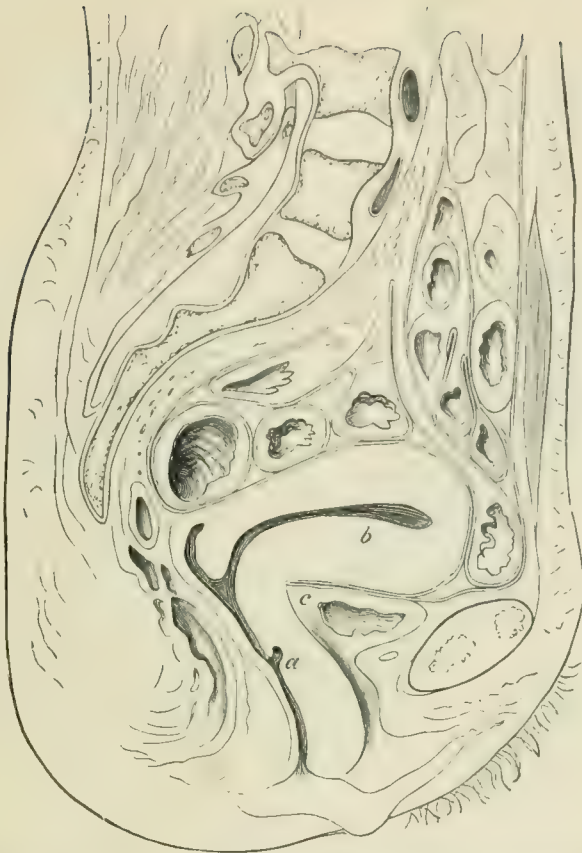


FIG. 6.—VERTICAL MESIAL SECTION OF PELVIS.—(PIROGOFF.)

*Showing form and direction of Vagina, relations of peritoneum and intestines, and position of uterus when the bladder is empty.*

*a. Vagina ; b. Uterus ; c. Bladder.*

The *vaginal cavity* appears in section as a sigmoid cleft with anterior and posterior walls in apposition, extending for 3 inches upwards and backwards and parallel to the plane of the brim. Note its direction in relation to the Vaginal and Bimanual examination.

The *cervix uteri* projects through the upper part of the anterior wall, making this wall 2 inches long, while the posterior is 3 inches.

In front of cervix is *anterior fornix* : note the relation of the finger, when placed in it, to the bladder, to the utero-vesical pouch of peritoneum which is empty, and to the body of the uterus.

Behind cervix is *posterior fornix* : note relation of finger placed in it to rectum and pouch of Douglas, which contains intestines (in its upper part). The deepest part of the pouch is not shown, the section passing to the left of the middle line posteriorly and not through the coccyx.

The *uterus*, which measures (externally) 3 inches long and 1 inch thick, and has a cavity of  $2\frac{1}{2}$  inches, is normally bent on itself to the front (ante-flexed), and turned forwards (ante-verted), its position varying with the distension of the bladder. Note that (in the Bimanual with both fingers in the anterior fornix, the uterus is grasped antero-posteriorly ; while with one finger in front and one behind the cervix, it can be grasped lengthwise.



frozen section is that it gives the closest approximation to the position of the structures during life. Such a section as that in fig. 6 practically makes the pelvis transparent in the middle line so that one can see

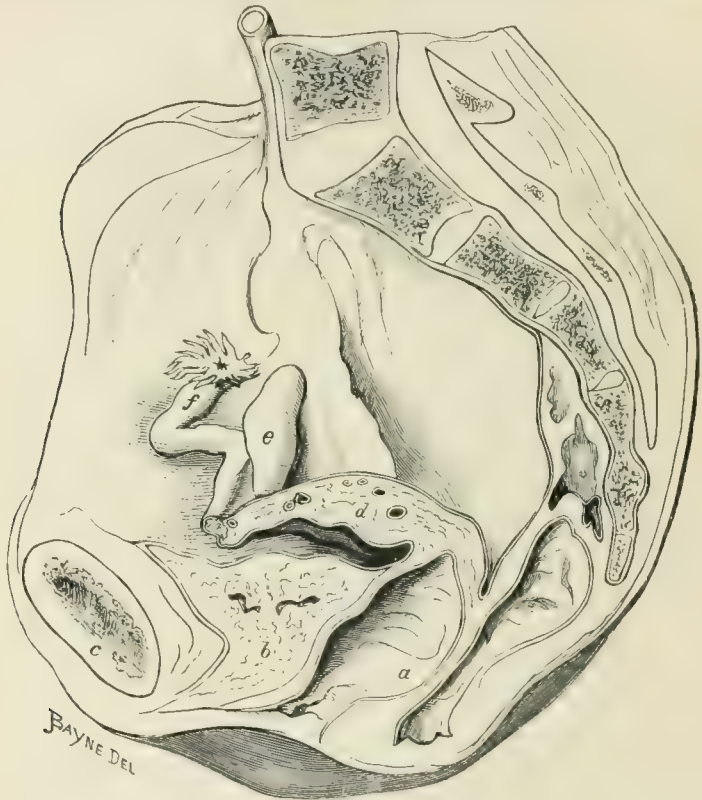


FIG. 7. SECTION OF PELVIS

*Passing through the Right Lateral Fornix and the base of the Broad Ligament.*

- a.* Vagina with wall separated; *b.* Bladder; *c.* Symphysis;  
*d.* Broad Ligament; *e.* Ovary; *f.* Fallopian Tube.

Note the relation of the finger placed in the fornix to the utero-vesical peritoneum and that of the pouch of Douglas (divided at the utero-sacral ligament), to the cellular tissue at the base of the Broad Ligament, and (at a higher level) to the Tube and Ovary.

Note the isthmus, ampulla, and fimbriated end of the Tube, as also the position of the Ovary.

anatomical structures as they are, nothing being left to the imagination. From it we learn the relation of the structures to the finger placed in the anterior and posterior fornices. For the lateral fornix we may take such a section as that in fig. 7. It also is a frozen section, but the intestines

have been lifted out so as to show the relations of the peritoneum. These sections show the exact disposition of the anatomical structures, and, taken with the table of pathological conditions most liable to affect them, give the best basis for physical diagnosis.

The appearance of the pelvic organs as seen through the brim is

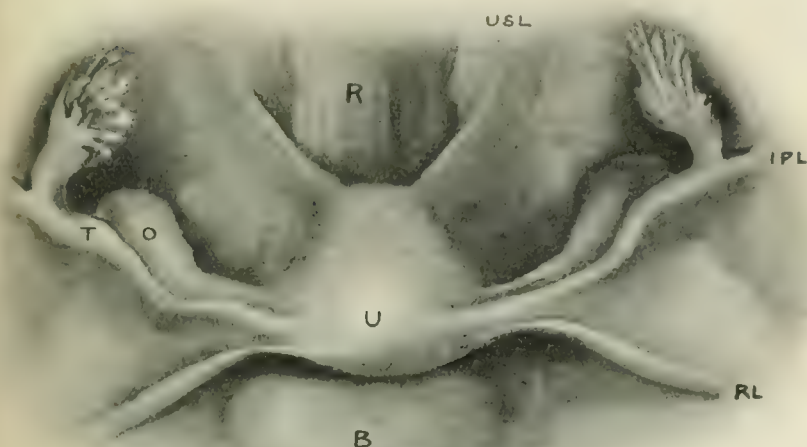


FIG. 8.—UTERUS AND ITS APPENDAGES AS SEEN THROUGH THE BRIM.

U. Uterus ; T. Fallopian Tube ; O. Ovary ; R.L. Round Ligament ;  
I.P.L. Infundibulo-Pelvic Ligament ; U.S.L. Utero-Sacral Ligament ;  
R. Rectum ; B. Bladder.

Note that the uterus rests on the bladder, the utero-vesical peritoneum being a mere fold. The intestines have been removed so as to show the pouch of Douglas, the lateral boundaries of the deep part of the pouch being the utero-sacral ligaments. The broad ligaments, which pass out from the uterus to the side wall of the pelvis, have in relation to their anterior layer the round ligament and in relation to their posterior layer the ovary, while the tube runs along the upper margin towards the side wall of the pelvis, the free edge of the broad ligament, which is unoccupied by the Fallopian tube, forming the infundibulo-pelvic ligament, or 'ovario-pelvic ligament'. The utero-sacral ligament is a fold of peritoneum passing from the uterus at the junction of the body and cervix backwards to the sacrum at the level of the second sacral vertebra.

shown in fig. 8. In it will be noted the relation of the uterus and its appendages, and the various ligaments which will be described in detail later on.

In the Bimanual examination (fig. 9), the patient, if she has been lying on her side during the vaginal examination, now turns on her back. The

fingers in the vagina are placed one in front of and the other behind the cervix, and with these fingers the uterus is lifted upwards and forwards towards the anterior abdominal wall (fig. 10). The left hand is laid on the abdomen about the level of the umbilicus, the whole of the palmar surface of the fingers being in contact with the skin surface. The fingers are gradually depressed until they almost reach the promontory of the sacrum. In this way everything within the true pelvis is as it were trapped below the abdominal hand, and the structures can be palpated and outlined between the fingers in the vagina and the hand so placed



FIG. 9.—POSITION OF HANDS IN BIMANUAL EXAMINATION.  
From a Photograph.

on the abdomen. The tips of the fingers must not be used alone but palpation carried out with the whole of their palmar surface. In outlining the uterus the vaginal fingers are used to lift it upwards and forwards towards the anterior abdominal wall. If the uterus is normally placed, the palmar surface of the abdominal fingers comes down on its posterior aspect and the body can be outlined between them and the fingers in the anterior fornix (fig. 11). Its position, size, mobility and tenderness are noted.

In palpating the organs bimanually, one hand should be stationary

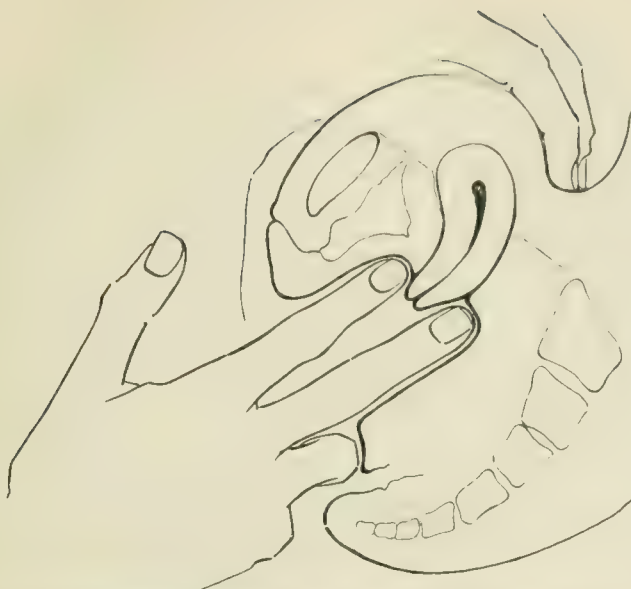


FIG. 10.—BIMANUAL EXAMINATION, SHOWING THE GRASP OF THE UTERUS BIMANUALLY TO ESTIMATE ITS LENGTH.

The index-finger is in the anterior and the middle in the posterior fornix and the uterus lifted up towards the abdominal wall. Note the change in the direction of the vagina as compared with fig. 4, the vaginal fingers in the bimanual examination being turned forwards, making the vagina at right angles instead of parallel to the conjugate of the brim. Also that the fingers of the upper hand are placed on the abdominal wall near the umbilicus so as to get the pelvic contents fairly between the hands.

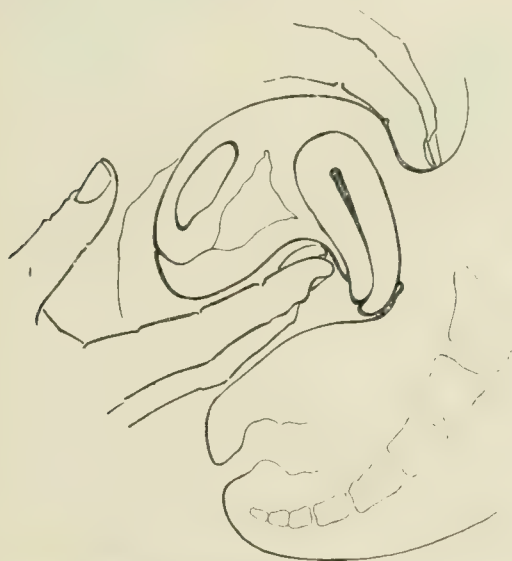


FIG. 11.—BIMANUAL EXAMINATION.

Position of fingers in anterior fornix so as to grasp the uterus bimanually when it is to the front. By this grasp its antero-posterior thickness is estimated.

while the other is moved. Otherwise, structures cannot be defined. The uterus or a tumour of any size can best be outlined by keeping the fingers of the lower hand steady and making the abdominal hand move over the surface of the tumour till its outline stands out. In dealing with smaller structures, *e.g.* the ovary, the upper hand is used simply to press down the pelvic contents against the vaginal fingers, by which the smaller body can be felt through the thinner vaginal walls. In making a bimanual examination we endeavour first to map out the uterus and then relate to it any pathological condition found.

For the various conditions found in relation to the uterus and its appendages, to the bladder and rectum, to the peritoneum and cellular tissue, see the table of pathological conditions recognised through the fornices (p. 13).

While there is nothing more important for a complete diagnosis than a good bimanual there are circumstances which make this examination difficult or impossible.

(1) *Nervousness of the patient.*—This is the most frequent cause of rigidity of the abdominal or pelvic muscles. It may be overcome by steady pressure while the patient's attention is diverted by conversation. Further, when the abdomen is rigid, the uterus may be recognised by lifting it up by the vaginal fingers towards the abdominal wall.

(2) *A distended bladder.*—To prevent mistakes here, the patient's statement that she has just passed water should never be trusted when a cystic tumour is found in the situation of the bladder. More than one 'ovarian tumour' has been removed not by the knife but the catheter. A flexible catheter may empty only the pelvic part of the bladder compressed against the pubes by a swelling in the pouch of Douglas. In such a case a male prostatic catheter, passed until its point is felt by the abdominal hand above the pubes, will alone exclude error.

(3) *A distended rectum.*—Should the rectum be loaded do not give an opinion but an enema. 'Prolapsed ovaries' may disappear after castor oil. A free purge has the further advantage that it removes flatus, which hampers the bimanual.

(4) *Obesity or rigid abdominal muscles* due to local tenderness may call for anæsthesia before an opinion can be given.

The possibility of more than one condition being present should always be borne in mind, *e.g.*, an ovarian tumour plus a gravid uterus or a fibroid plus a dilated tube.

4. **Rectal and Recto-vaginal Examination.**—Examination *per rectum*, were it not unpleasant for the patient (a finger-stall makes it safe for the examiner), would be more used than it is. Through the thinner rectal wall the pelvic contents are palpated more easily and without the upward displacement caused by vaginal examination. It is of special value in the examination of a virgin, as most pathological



conditions of importance can thus be determined without causing the patient much pain at the time or leaving the sense of having been 'examined'.



FIG. 12.—RECTO-VAGINAL EXAMINATION.

Note that the middle finger in the rectum can reach up higher than the vaginal finger can without displacing the uterus. Further, that the lower part of the pouch of Douglas, with any body in it, can be got between the fingers.

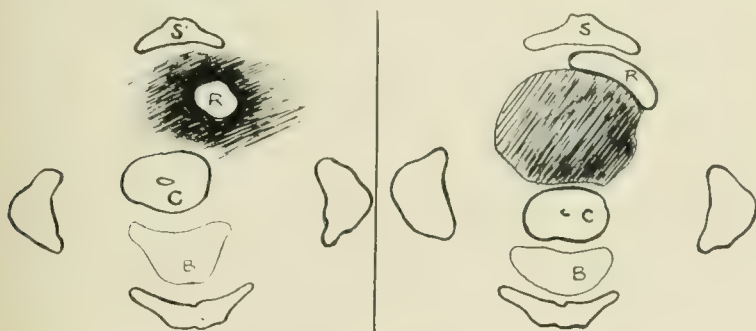


FIG. 13.—DIAGRAM CONTRASTING CELLULITIS AND PERITONITIS, AS FELT PER RECTUM.

C. Cervix; B. Bladder.

The cellullitic exudation embraces the rectum (R), while the peritonitic flattens it against the sacrum (S).

In examining *per rectum* the examining finger should be directed upwards and forwards, following the direction of the anal canal (fig. 6). Explain to the patient that you wish to examine the bowel, and see that

the finger is cleansed both before and after examination, even when a finger-stall is used.

In *recto-vaginal examination*, the index-finger is introduced into the vagina, and the middle finger into the rectum (fig. 12). The deep part of the pouch of Douglas lies between the fingers, and any body within it, *e.g.* an ovary, is distinctly felt.

In cancer we can by examination *per rectum* ascertain better the extent of infiltration; hæmorrhage is not set up; and enlarged glands may be made out. A deposit in the pouch of Douglas can be located exactly between the vaginal and the rectal fingers and the distinction made between an exudation which flattens the rectum (intra-peritoneal) and one which arches round it (cellulitis) (fig. 13).

**5. The Speculum.**—This is not used so much now as formerly, as a practised finger gives the required knowledge without the exposure that the speculum implies. Its use is supplementary, adding sight to touch. Sims' speculum gives a wider view than the tubular speculum of Fergusson, and is the only one with which other instruments, *e.g.* sound or curette, can be used. It consists of two blades—a smaller one for multiparae and larger for nulliparae. A more useful form for operative work is a combination of the Sims and Fergusson, the tubular handle serving to carry off fluid in operations with the patient in the lithotomy posture. The patient is placed in the Sims position (fig. 14): on the left side, with the right knee drawn up beyond the left so that it touches the couch, and the left arm drawn out from under her, while the right hangs over the side of the couch. The patient thus lies half over on her face, and the pelvis is tilted so that the abdominal contents tend to gravitate towards the diaphragm. The negative pressure produced on the pelvic floor makes the vagina distend with air when the vaginal orifice is opened up by the speculum. *The posture is the essential factor* in this method of examination; the speculum is used simply to pull back the perineum and give a view of the whole vaginal cavity, just as a spatula is used to depress the tongue in the examination of the throat. Before introduction the speculum is warmed, and vaseline rubbed on the convex side of the blade to be used. Two fingers are passed, as a guide, through the vulvar orifice, and the blade is introduced with its greatest breadth corresponding to the direction of the vulva. It is then turned round so as to draw back the perineum, which can be firmly retracted without causing pain.

The speculum is used when we wish to see the vaginal mucosa, as in granular vaginitis, to locate a fistula, to ascertain the extent of a cervical catarrh or the appearance of a tumour springing from or projecting through the cervix. It is also required in dilatation of the cervix, curetting, and other minor operations.

**6. The Sound or Uterine Probe**, which we owe to Sir J. Y. Simpson, is used to measure the length of the uterine cavity, to determine its



relation to a tumour, or to supplement information gained by the bimanual as to the position of the uterus. The introduction of the latter method of examination has greatly restricted the use of the sound. We do not now regard the sound as a probe; nor should it be used unless the position

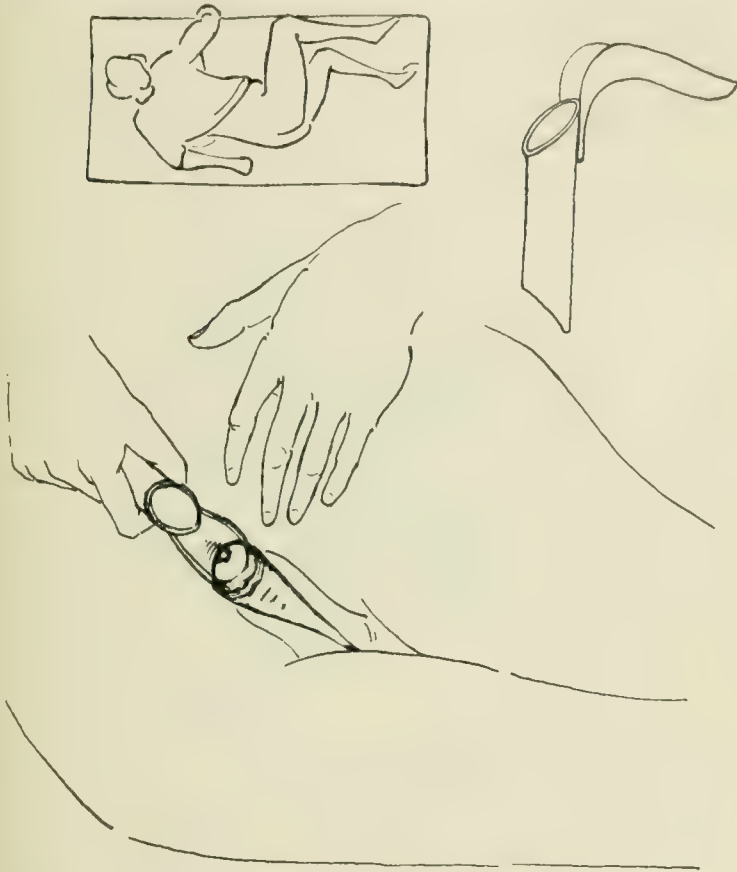


FIG. 14.—EXAMINATION WITH THE SPECULUM.

The speculum used has a Sims' blade, the tubular handle being shaped like Ferguson's speculum. The key diagram shows the Sims' position—looking down on the patient from above. The assistant draws back the perineum with the speculum in the right hand, while the left hand draws up the buttock.

of the uterus has been determined by the bimanual. Further, the fact that the normal uterine cavity is sterile while the vagina is not, renders the same precaution necessary for it as for the catheter. The cervix must be exposed by speculum and cleansed with swab before the sterilised

sound is passed (fig. 15). Menstruation should be inquired into before passing the sound, so as to exclude pregnancy. Do not pass the sound if the patient has passed a period.

The size of the uterus is easily determined: the knob,  $2\frac{1}{2}$  inches from the point, marks the length of the normal uterine cavity. To determine the relation of the cavity to a tumour in the wall, the sound must be combined with the bimanual, as suggested by Sir Alexander Simpson—see fig. 16.

In introducing the sound, if the patient is on her left side the index

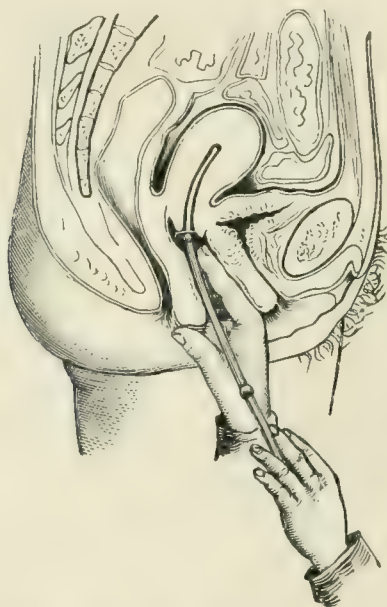


FIG. 15.—PASSING THE SOUND, WITH THE UTERUS TO THE FRONT.

The vaginal finger tells whether it has entered as far as the  $2\frac{1}{2}$  inch knob, or beyond it.

finger of the right hand is placed in the vagina on the anterior lip of the cervix and the sound, held in the left hand with its curvature directed backwards, is introduced for one inch into the cervix. Should the uterus be to the front, the handle of the sound is now swept round in a wide curve, and then carried backwards towards the perineum so that the point, following the uterine curvature, passes into the uterus. If the uterus is turned backwards, the handle is carried forwards towards the pubes without rotation. With the patient in the dorsal posture, the sound is introduced between the patient's thighs, the left hand which holds

it being carried over the abdomen, while the guiding finger is passed into the vagina underneath the drawn-up right leg.

**7. Dilatation of the Cervix with Curettage.**—Dilatation of the cervix is another method of examination which we owe to Sir J. Y. Simpson. The sponge tent was the parent of the safer metal dilator born

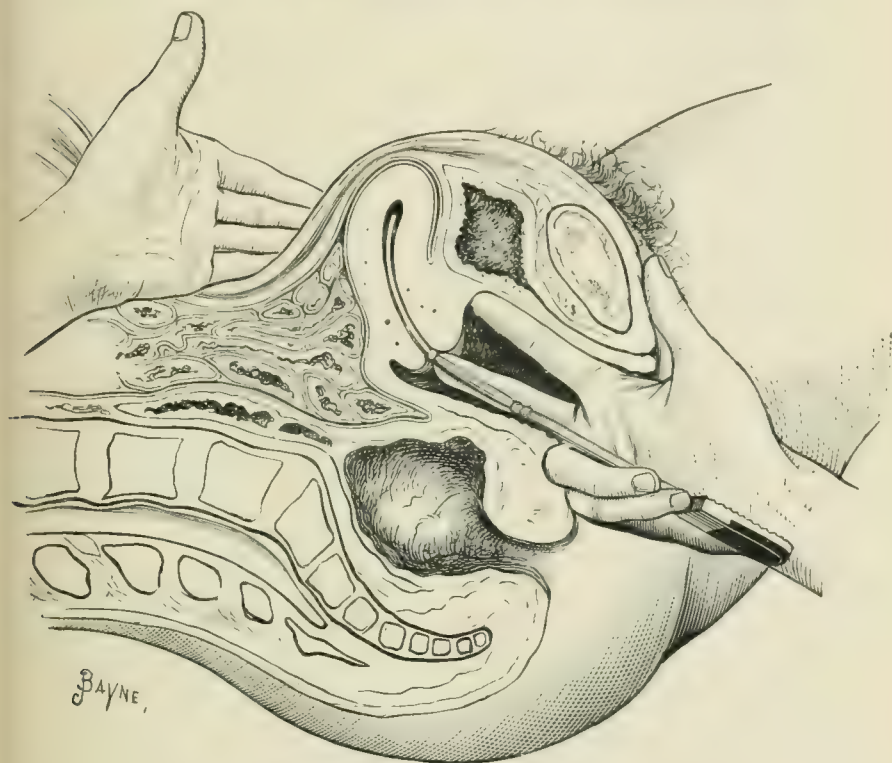


FIG. 16.—BIMANUAL EXAMINATION COMBINED WITH THE SOUND.—  
(A. R. SIMPSON.)

The Sound is used to define the uterine cavity so that the fingers of the external hand may determine the exact position of the fundus. This is specially useful when, from the presence of small fibroids or pelvic deposits, there is doubt as to what is the fundus uteri.

of the aseptic principle. Graduated metal bougies are better than an expanding metal dilator, which is more liable to tear tissues. The idea of dilatation is to bring the uterine cavity within reach either of the finger or of the curette, which, aided by the microscope, demonstrates the condition of the mucosa.

For **Dilatation** anaesthesia is necessary. The patient is placed in the

lithotomy posture, the Sims' speculum introduced, the cervix drawn down and steadied by volsella. After douching the cervix the dilators are introduced, care being taken that they follow exactly the curvature of the uterus as ascertained by careful bimanual (fig. 17). The dilators are

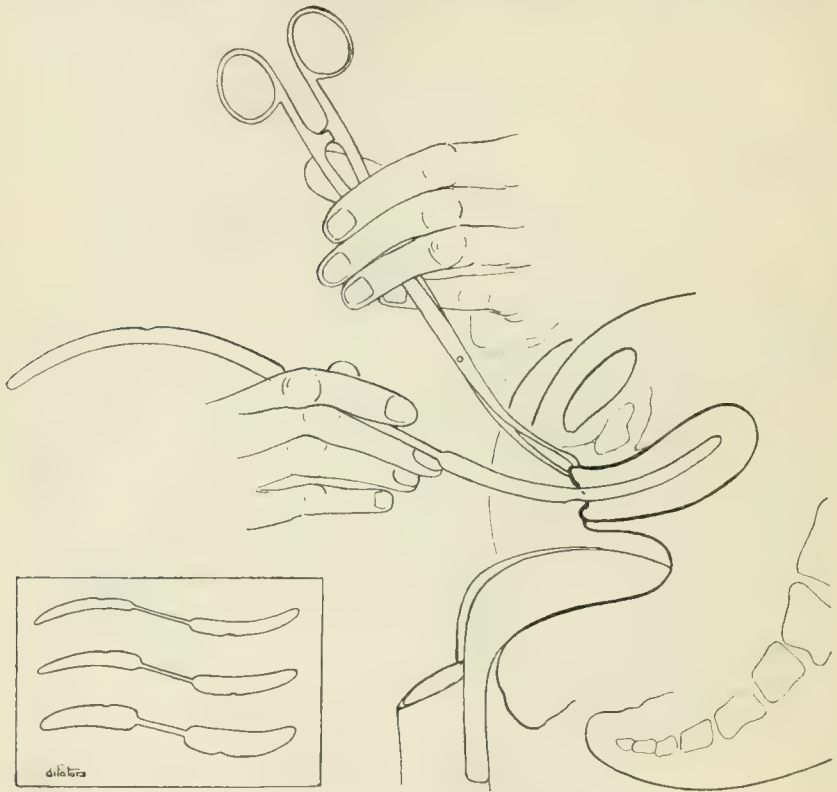


FIG. 17.—DILATATION OF THE CERVIX.

The dilators are graduated, a different size on either end of the shaft, which is held as in diagram. The cervix is drawn down and fixed with the volsella. The dilator is passed with its curvature corresponding to the direction of the uterus as ascertained by bimanual examination—in this case forwards; and pushed in up to the  $2\frac{1}{2}$  inch notch. The degree of dilatation depends on what is to be introduced, the largest dilator being necessary when the finger is to be inserted, as in fig. 18.

introduced with as little force as possible, being allowed to feel their way in rather than be pushed in. Resistance is mainly at the os internum. Usually the cervix is only dilated sufficiently to admit the curette, but if the cervix dilates easily, as after recent abortion or in cases of an intra-uterine polypus, dilatation is carried on till the finger can be introduced.

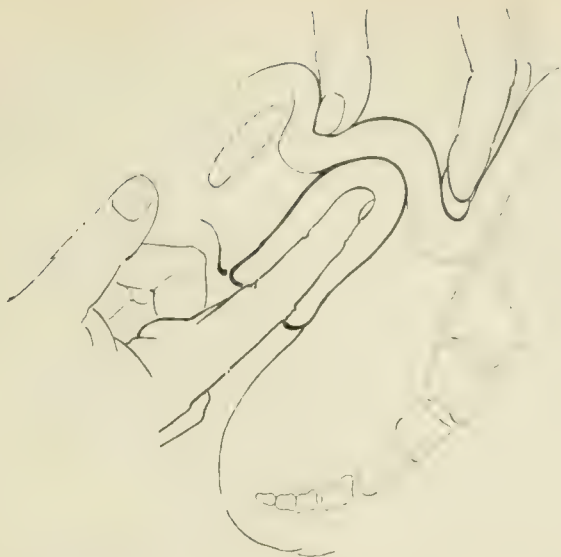


FIG. 18.—EXAMINATION OF THE UTERINE CAVITY WITH THE FINGER.

Note that the fingers of the upper hand are used to press down the fundus on the uterine finger, thus making sure that the latter reaches the fundus. This manoeuvre is useful in clearing out the remains of an abortion, and in determining the attachments of a polypus, or the situation and extent of a malignant affection of the endometrium.

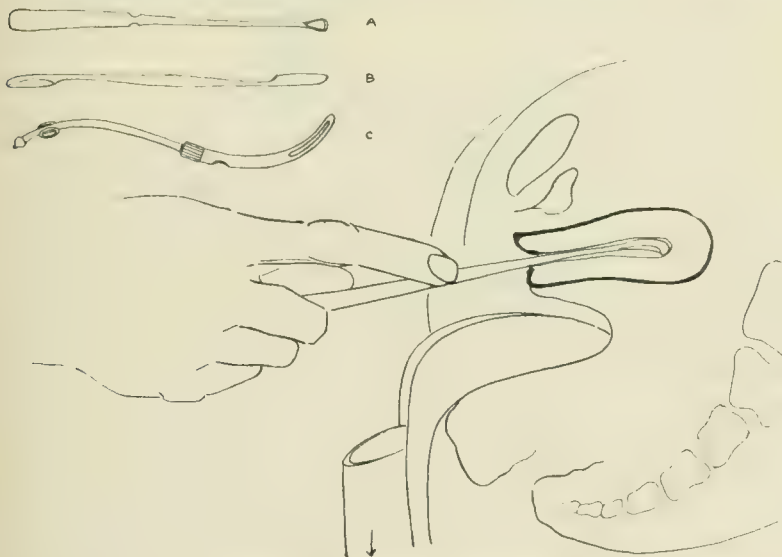


FIG. 19.—DIAGNOSTIC CURETTAGE.

The curette has a loop end (A) or a scoop-shaped end (B). Note that the cervix has to be dilated sufficiently to admit the curette and that the uterus is drawn down and straightened out in curetting. The volsella, drawing down and fixing the cervix as in fig. 17, is not shown. After curetting, the uterus is washed out with a two-way catheter (C). The fragments of endometrium removed are collected in a dish placed beneath the tubular handle of the speculum.

The advantage of the finger over the curette in clearing out an incomplete abortion or localising a cancer is obvious.

When the *finger is to be introduced* into the uterine cavity it is better to take the volsella off the cervix and use the upper hand to press down the fundus on the finger (fig. 18). By this means we can not only steady the uterus more efficiently in clearing out the remains of an abortion, but the thickness of its walls and their relation to a tumour can be better estimated.

For **Curettage** the loop curette or elongated spoon curette is used. Grasping the curette in the hand, with the forefinger placed on the shaft on the opposite side from the cutting edge so as to determine the amount of pressure used (fig. 19), we bring the point across the fundus uteri, Fallopian tube angles, down the junction of the walls; then over each wall in turn. Portions of tissue removed are collected in a glass basin, washed from blood, and put in 5 per cent. formalin to harden. After curetting, the uterine cavity is washed out with a mild antiseptic, such as 1 in 100 lysol or boric lotion. A two-way catheter is used to avoid forcing the fluid along a dilatable Fallopian tube.

**8. Microscopic Examination of the Tissues removed by the Curette and of Vaginal and Urethral Discharges.**—This leads up to a consideration of the methods of laboratory investigation.

### LABORATORY INVESTIGATION.

Before considering this, reference must be made to the value of *examination of the blood* in cases where suppuration is suspected. Frequent blood counts are required to determine the amount of leucocytosis. In addition to a simple enumeration of the leucocytes, a differential count ought to be made.

Laboratory investigation may be either *bacteriological* or *histological*.

In some cases a **bacteriological examination** is required, and this may be carried out by means of cover-glass preparations, cultivations of the organisms, or animal inoculation. In all cases cover-glass preparations should be made, but differentiation of the organism may not be obtained without culture or inoculation. The material which the gynecologist is called upon to examine bacteriologically is that obtained from vaginal or uterine discharges, from pus tubes, or from the peritoneal cavity.

In examining a *leucorrhæal discharge*, the vulva should be exposed and the discharge taken up either on a sterile cotton-wool swab or on a platinum loop. If in a suspected gonorrhæal case the discharge is scanty, a sufficient quantity of pus can usually be obtained by stripping



the urethra from above downwards with the finger through the anterior vaginal wall. A drop of pus is thus made to appear at the urethral orifice. It is then smeared evenly over a cover-glass which has been washed in alcohol and dried. The gonococcus is usually the organism the presence or absence of which we wish to determine. The cover-glass should be dried in the flame of a spirit lamp or Bunsen burner. It is held in a pair of forceps and stained with any simple solution, such as methylene-blue. This is left on for fifteen seconds, the cover-glass being gently heated over the flame. It is washed in water, dried and mounted on a slide with balsam. Gonococci are seen lying between the pus cells and a great many of them are intracellular, within the polymorphous cells. They are arranged in pairs or in fours as in fig. 20. In order to differentiate them from other diplococci, some films should be stained by Gram's method. The gonococcus is decolorised by this method, whilst most other cocci retain the stain. For all practical purposes the demonstration of such a Gram negative intracellular diplococcus in a vaginal

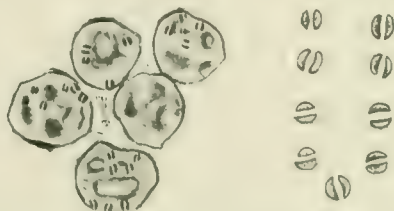


FIG. 20.—GONOCOCCI IN PUS CELLS, AND ENLARGED  
DIAGRAMMATICALLY TO SHOW THE SHAPE OF THE DIPLOCOCCI.

discharge is sufficient for the diagnosis of gonorrhœa. If, as in a medico-legal case, absolute proof is required, cultures ought to be taken on a culture medium containing blood serum or some albuminous fluid, such as hydrocele fluid.

In certain cases it may be important to obtain material uncontaminated from the *interior of the uterus*. The best way in which to obtain this is to introduce a Sims' or a tubular speculum into the vagina and then pass directly into the cervical canal a sterilised curved glass tube, the outer end being kept closed during introduction. A rubber bulb is now attached to the end of the tube and any secretion present in the cavity of the uterus sucked in. The material so obtained can be examined either directly or by culture. This is a method which is frequently used in obstetric practice in order to ascertain the infecting organism in cases of puerperal sepsis.

For the bacteriological examination of pus *in the tube* or other tissues, the material is best collected in an ordinary sterilised test-tube. From this the pus can be transferred by means of a platinum needle to culture-

tubes and cover-glasses. In cases of general peritonitis the fluid is obtained when the abdomen is opened, either by means of sterile swabs, or, better, with a sterilised glass tube, narrow and rounded at one end and fitted at the other with a sterile rubber cap. The fluid can thus be sucked into the tube and transferred to the culture medium.

In certain cases, especially in tuberculous and pneumococcal infections, a definite diagnosis of the infecting organism can only be made after animal inoculation. For the method of performing this and for a description of the morphological and cultural characters of the various organisms, the student is referred to any of the standard text-books on Bacteriology.

**Histological Examination.**—We do not propose to give in detail a description of the various methods for preparing and examining pathological material. Staining methods are now so numerous and in some cases so complicated, that a full description of them is quite impossible in a book of this scope. All we shall do is to indicate the method of obtaining and preparing the material for ordinary routine examination and diagnosis.

The tissues which the gynecologist is called upon to investigate for the purposes of diagnosis are chiefly fragments of the endometrium removed by the curette, pieces of tissue excised from the cervix or from some part of the external genitals, and sections of tumours removed at abdominal operations. If time permits, these various tissues should be fixed, hardened, cut and stained in the laboratory by one of the processes about to be described. When an immediate report is required, the tissue may be cut fresh by the freezing microtome and immediately stained. We shall indicate shortly the method of dealing with the tissues mentioned.

**Uterine Scrapings.**—When the uterus is curetted the fragments of endometrium removed should be collected in a dish placed beneath the speculum. The collection of all fragments of tissue is facilitated by the use of the combined Sims' and Fergusson's speculum, shown in figs. 14 and 19. The Sims' blade is in the vagina, and, the patient being in the lithotomy posture, the scrapings run down through the tubular part into the dish placed beneath. It is important that the pieces of mucosa removed be of fair size, and to ensure this the curette ought to be used with wide sweeps, either from fundus towards cervix or from side to side. If a roughened area is felt inside the uterus, the scrapings from this may be collected in a separate dish. Mixed with the fragments of mucosa there is always a considerable amount of blood and blood-clot, and it is important to wash this away before the tissue is put in the fixing agent. The dish is therefore held under a tap of running water so as to get rid of the blood as far as possible. Leaving a small quantity of water in the bottom of the dish, the fragments of mucosa, which show up white, are carefully lifted with a pair of dissecting forceps and put into a test-

tube or small bottle containing the fixing agent. The tissue should not be allowed to remain for any length of time in water, otherwise the cells alter in character.

Various fixing agents may be used. The most useful one is a solution of 5 per cent. formalin. The scrapings are kept in this for twenty-four hours, then transferred to spirit of different strengths, first 60 per cent., then 90 per cent., and then absolute alcohol, about six hours in each. From alcohol they are transferred to some clearing agent such as xylol or chloroform. If the former is employed, they remain in it until the fragments become transparent and are then put into soft paraffin in an oven. After a few hours they are transferred to a harder paraffin melting at 54° C. The paraffin is poured into a mould and the separate pieces of tissue are put into it so that the fragments lie close to each other. The mould is placed in cold water, and when the paraffin has solidified the block can be trimmed down, and the tissue is ready for cutting with the microtome.

Instead of being fixed in formalin, the tissues may be placed directly in methylated spirit or in absolute alcohol. This causes a little more shrinking, but otherwise the fixation is good. Corrosive sublimate, a saturated solution, may also be employed as a fixative. If it is used, very thorough washing is necessary before the tissue is transferred to alcohol. If one of the more delicate staining methods is to be employed, such as the Unna-Pappenheim, a special fixative such as Zenker's fluid must be used.

The block is cut in the ordinary way with a rocking microtome, and the sections are floated in warm water and transferred to slides. The slides are placed in an oven about 37° C. for a few hours. The sections thus become fixed to the slide. The paraffin is dissolved off by placing the slide in xylol. The xylol is got rid of by washing in methylated spirit followed by water. The sections are then stained with hæmatoxylin and eosine. They are kept in hæmatoxylin for from fifteen to thirty minutes, then placed in running water until the tissue becomes blue. A saturated solution of eosine is applied for about half a minute, the slide again washed in water, carefully dried and put into absolute alcohol in order to dehydrate completely. The slide is now transferred to xylol to clear the tissues and make them transparent, the excess is wiped off, a drop of balsam applied and a cover-glass put on.

In this way sections are obtained which are sufficiently good for most diagnostic purposes. If more detail is required as to minute cell structure, more elaborate methods of preparation and staining are necessary, for details of which a text-book on laboratory technique must be consulted.

The foregoing description of the preparation of uterine scrapings for microscopic examination applies equally to larger pieces of tissue

removed from the cervix or from tumours. The larger the piece of tissue, the longer the time that must be allowed for fixation and for dehydration.

The results of microscopic examination will be found under the various pathological conditions.

## II

### THE PATHOLOGICAL CONDITIONS





## PATHOLOGY AND DIAGNOSIS OF MORBID CONDITIONS

FROM this brief sketch of the methods of Gynecological diagnosis we pass to a description of the Pathological Conditions. We consider these as giving a basis for physical diagnosis. Our object is to present Gynecological Pathology as far as possible in its relation to physical diagnosis. The illustrations are for the most part original, based on material obtained during the past five years, chiefly from the operating theatre and studied in the University Gynecological Laboratory. In studying the various conditions we follow the order of importance in Gynecological examination, taking up first the Uterus, then its Appendages (ovary, tube, and adjacent structures), the Peritoneum and Cellular Tissue, and finally the less important affections of the Vagina and Vulva. In each case we shall preface the description of the Pathological by a reference to the normal Anatomy and Histology.

While under each lesion we have to consider on the one hand the pathological changes and on the other clinical phenomena, the prominence given to these will necessarily vary. In ante flexion of the uterus the pathological description is largely based on clinical phenomena; while in an ovarian tumour, on the other hand, pathology is prominent, the condition lending itself to a complete pathological description based on the study of actual specimens. This explains the want of uniformity in the headings under which the various conditions are described.

In examining a Gynecological case we first find the uterus. Further, we ascertain its form, size and position. Without knowing these we cannot define it. We grasp it bimanually and ask whether we have the uterus, the whole uterus and nothing but the uterus between the hands. 'Nothing but the uterus' raises the question whether there is not a tumour in addition to it.

As regards the *form* of the uterus, the preparations given in fig. 21 show that it is a pear-shaped organ consisting of body and cervix. The anterior and posterior walls are in contact so that no cavity is seen on antero-posterior section. On coronal section the cavity of the body is triangular in shape, with the apex of the triangle downwards. This point corresponds to the os internum, below which is the fusiform cavity of the cervix limited below by the os externum. At either end of

the base of the triangle is the opening of the corresponding Fallopian tube.

As regards its *size*, exact measurement is not applicable to clinical work beyond the length of the cavity from os externum to fundus. This, determined by the sound, is for the normal non-pregnant uterus  $2\frac{1}{2}$  inches. The thickness of the walls varies, but averages half an inch. The length of the uterus grasped on bimanual examination (fig. 10) may be given as 3 inches (fig. 22, A). As the cavity in antero-posterior



FIG. 21.—UTERUS IN ANTERO-POSTERIOR AND CORONAL SECTION.

Note that in the former, from the apposition of the walls, no cavity is seen, also that the canal is constricted at the os internum. On coronal section the cavity of the body forms an inverted triangle with the constriction of the os internum at its apex and the openings of the Fallopian tube at either end of its base. The lumen of the cervical canal is fusiform from the constrictions at the os internum and externum.

section is a mere slit, the thickness of the uterus grasped as in fig. 11 may be taken as 1 inch (fig. 22, A). The breadth of the uterus is difficult to estimate binannually, but allowing an inch for the cavity between the Fallopian tubes its greatest breadth is 2 inches (fig. 22, B).

The *position* of the uterus in the body is shown in fig. 6. The cervix forms with the body an angle open to the front, that is, the uterus is anteflexed; its general axis is directed forwards, that is, it is anteverted; and it rests on the bladder, the utero-vesical pouch being empty. The position of the normal uterus, at a given moment, depends on the amount of urine in the bladder. As the bladder distends, the uterus is pushed back into a position of retroversion (fig. 23), becoming anteverted again when the bladder is emptied.

We consider now the pathological conditions affecting the form, size and position of the uterus.

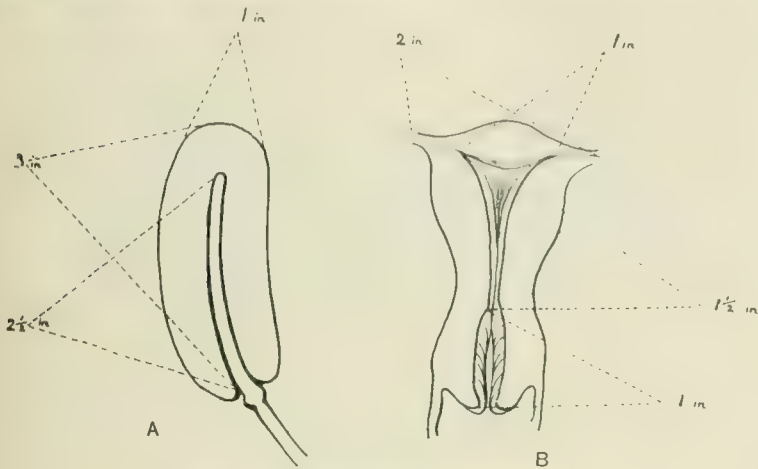


FIG. 22.—MEASUREMENTS OF UTERUS.

- A. Length of cavity, measured by sound,  $2\frac{1}{2}$  inches ; of whole uterus, 3 inches ; antero-posterior thickness, 1 inch. B. Breadth of cavity between openings of Fallopian tubes, 1 inch ; external breadth, 2 inches. Length of cervical canal, 1 inch ; of cavity of body,  $1\frac{1}{2}$  inches.

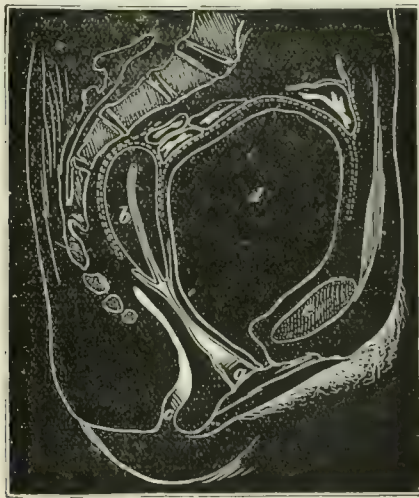


FIG. 23.—SECTION OF PELVIS WITH DISTENDED BLADDER.—(PIROGOFF.)

- a.* Vagina ; *b.* Uterus ; *c.* Anus ; *d.* Bladder ; *e.* Symphysis. Note that the distended bladder makes the uterus retroverted.

Departures from the normal form, **Malformations**, are rare. The uterus may be rudimentary (fig. 24), a mere band of fibrous tissues on the posterior aspect of the bladder; and in this case the peritoneum forms one pouch between the bladder and rectum. While the fully formed uterus is mesial and single, developmentally it is double, being produced by the coalescence of the ducts of Muller. These ducts coalesce as far as the insertion of the round ligaments which mark where the uterine cavity ends and the Fallopian tube begins. Should the blending of the ducts

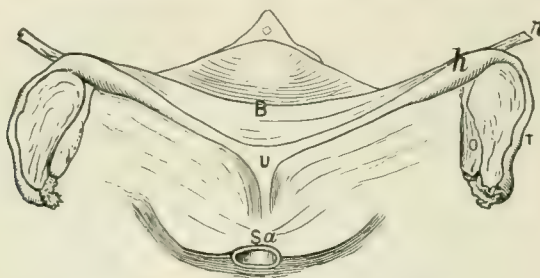


FIG. 24.—RUDIMENTARY UTERUS.—(VEIT.)

Sa. Sacrum; U. Solid rudiment of uterus; h. Rudimentary horn; B. Bladder; O. Ovary; T. Fallopian tube; r. Round ligament.

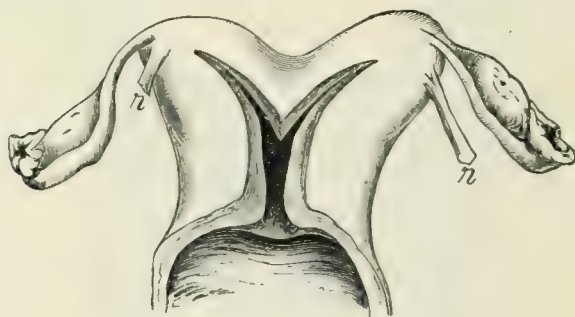


FIG. 25.—UTERUS BICORNIS.

r. Round ligament, which marks where the horn ends and tube begins.

not take place up to this point, a bicornuous uterus is produced (fig. 25); and if they blend externally, but the ducts do not coalesce, the uterus is divided by a vertical partition. The fact that the uterus is thus divided is of little gynecological significance unless one half of the canal is not pervious in its lower part. When menstruation sets in, the menstrual blood accumulates in the non-pervious half, as is shown in the preparation given in fig. 26.

Under alterations in *size* we consider first cases in which the uterus is **undersized**, having a cavity measuring less than  $2\frac{1}{2}$  inches. This may

be present from puberty as a congenital condition, or arise later in life. Congenital cases usually come under notice through the patient seeking advice on account of non-appearance of menstruation. In the unmarried, such cases should not be examined in the first instance unless there are

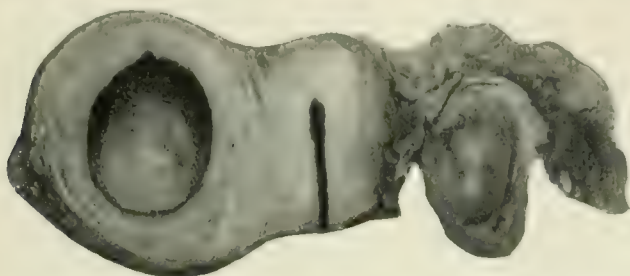


FIG. 26.—UTERUS REMOVED FROM A PATIENT AGED 19 WHO HAD MENSTRUATED FOR TWO YEARS WITH INCREASING PAIN, CALLING AT LAST FOR HYSTERECTOMY.

Note accumulation of blood in the non-pervious half, which does not communicate with the vagina.

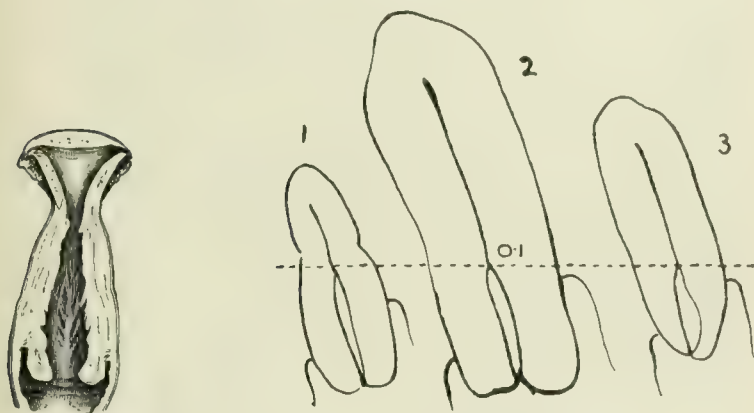


FIG. 27.—INFANTILE UTERUS IN CORONAL SECTION.

1. Diagram of same in Vertical Mesial Section for comparison with 2, Normal Uterus, and 3, Atrophy of Uterus. The line drawn through the os internum, O.I., separates the body from the cervix. The infantile differs from normal in the smaller size of the body. Atrophy, in which body and cervix are relatively small, may be congenital or puerperal (compare fig. 28), and occurs normally after the menopause.

urgent symptoms. If on examination a small uterus is found, this may be due to defective *development* or *growth*. There may be a large and well-developed cervix with a small fundus above it—the 'infantile uterus' (fig. 27). It is so called because the organ has not *developed*



but remained of the infantile type, the relative increase in the size of the body which usually takes place at puberty not having occurred. In other cases both cervix and body are small: the normal transition from the infant to the adult type has occurred, but the uterus as a whole has not *grown*. This is known as 'congenital atrophy'.

A uterus originally normal in size and function may atrophy during the puerperium. To this *puerperal atrophy* Sir J. Y. Simpson applied the term 'superinvolution'. Fig. 28 shows an abnormally small uterus from a case of superinvolution. It has the interest that it is a life-sized reproduction of the specimen from which Sir J. Y. Simpson originally described this condition.

**Clinical Phenomena—*Diagnosis*.**—The diagnosis between these forms of small uteri is made from the history as well as from physical examination. In congenital conditions the patient may not have menstruated and will probably remain sterile, while in superinvolution there is the history of childbirth or abortion followed by amenorrhœa.

**Increase in size** of the uterus is produced by permanent changes in its tissues, to be described under Endometritis and Fibrosis Uteri, or by the presence of tumours in its walls, especially fibroid tumours. Increase in size will be considered under these various lesions.

### CHANGES IN THE POSITION OF THE UTERUS: DISPLACEMENTS.

To understand displacements we must consider what determines the normal position of the uterus. The uterus taken out of the body lies flat on a plate, the axis of its body and cervix coinciding. In the body its form and position are the result of a balance of forces. It is subjected to continuous downward pressure varying with respiration and muscular strain. Counteracting this force we have the pelvic floor and the connective and muscular tissue (ligamentum colli) in the base of the broad ligament, and what we might describe as four guy-ropes, namely, the two round ligaments in front and the utero-sacral ligaments behind (fig. 8).

The uterus is thus supported by the connective and muscular tissue around the cervix and by the pelvic floor (the fascia and levatores ani); while its forward direction is due to the action of the utero-sacral ligaments, which keep the cervix backwards, and of the round ligaments, and especially intra-abdominal pressure, which keep the fundus directed forwards.

Each of these factors calls for a short reference. While the importance of the pelvic floor as a means of support was pointed out many years ago by Berry Hart, the part played by the connective and muscular



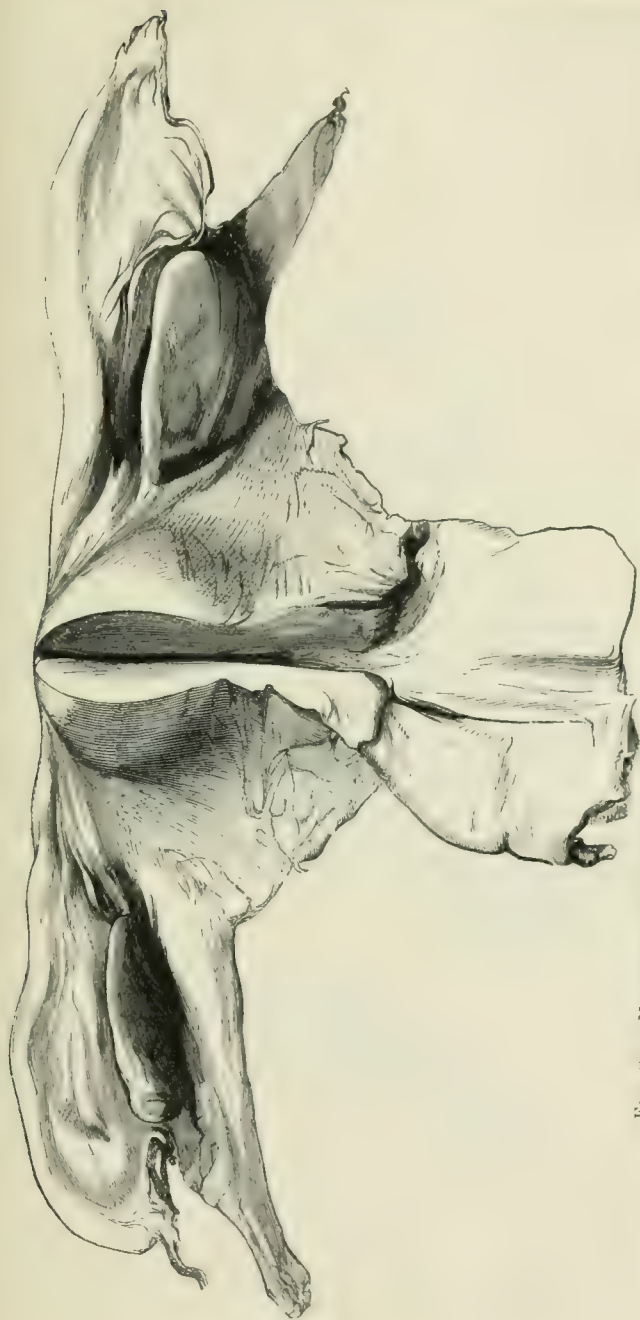


FIG. 28. — UTERUS AND OVARIES FROM A CASE OF SUPERINVOLUTION. — (SIR J. Y. SIMPSON.)  
 Uterine cavity measures  $1\frac{1}{2}$  in. Thickness of posterior uterine wall (laid open in figure)  $\frac{1}{4}$  inch. Tissue of uterus, dense and fibrous.  
 Ovaries atrophied, with increase of fibrous tissue and no appearance of Graafian follicles.

tissue (ligamentum colli) at the base of the broad ligament in relation to the uterine artery has only recently been emphasised. After the uterus has been freed in front and behind, in the operation of vaginal hysterectomy, it cannot be pulled down until this perivascular tissue has been divided. The action of the utero-sacral ligaments is brought out by the fact that when these do not regain their tone in the puerperium there is a tendency to retroversion, also by the fact that the normal ante flexion is exaggerated when these ligaments are contracted by cicatrisation after utero-sacral cellulitis. The part played by the round ligaments is of less importance, but use is made of them in the operative treatment of displacements. Intra-abdominal pressure is a factor in constant operation. So long as the cervix is drawn back by the utero-sacral ligaments and the fundus kept forward by the round ligaments, this pressure acts on the posterior aspect of the uterus and moulds it on the water-cushion of the bladder. Should the uterus, however, be temporarily retroverted, intra-abdominal pressure will now act on its anterior surface and keep up retroversion, and even bend the fundus backwards into retroflexion.

Certain terms are applied to the position of the uterus which call for definition. *Flexion* expresses the relation of the parts of the uterine axis to each other; *version*, the relation of the axis of the uterus as a whole to the axis of the pelvis; while 'position' is applied to its place in the pelvis. The normal uterus is ante-flexed, bent on itself with an angle open to the front; ante-verted, turned forwards; and rests on the bladder (see fig. 6). A uterus may present these features but be drawn back as a whole in the pelvis, when it is said to be *retro-posed*. In retro-version, the uterus is turned backwards; in retro-flexion, it is also bent backwards on itself.

Descent of the uterus as a whole in the pelvis is called *prolapse*. By *inversion* is meant the turning of the uterus inside out so that its mucous surface becomes external, and the peritoneal aspect of the fundus is converted into a cup.

There has been considerable difference of opinion as to the significance of uterine displacements. This has been due to lack of attention to their etiology, and of discrimination between symptoms arising directly from them and from pathological changes secondary to them. Diagnosis here covers more than the recognition of a condition. It is not sufficient to recognise that the uterus is retroverted. We must determine whether the condition may not be congenital or the result of adhesions, and also whether the position of the uterus accounts for the symptoms of which the patient complains. On such exhaustive diagnosis alone can sound treatment be based. The term 'displacement' requires discrimination in its use. It is open to question whether ante flexion, which is usually an exaggeration of a normal condition, should be called a displacement.

Further, the term displacement suggests replacement, which is required only in a certain number of cases.

**ANTEFLEXION.**

Anteflexion may be congenital or acquired.

**Congenital Anteflexion.**—When congenital, the usual form, there is exaggeration of the normal forward curvature and nothing more. It is



FIG. 29.—CONICAL VAGINAL PORTION WITH PIN-HOLE OS.

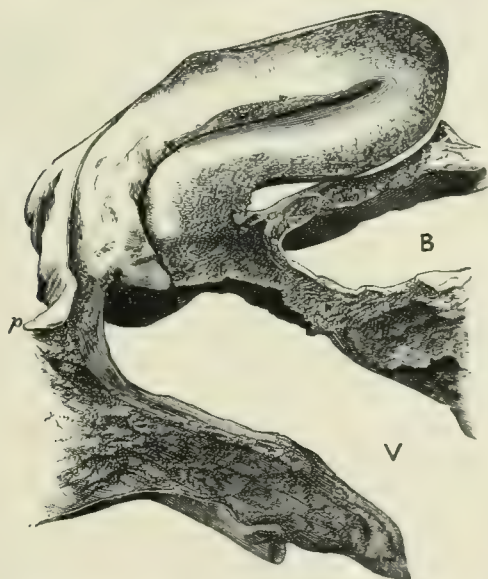


FIG. 30.—ANTEFLEXION WITH STENOSIS OF OS EXTERNUM.—WINCKEL.

V. Vagina; B. Bladder; *p.* peritoneum of pouch of Douglas.

therefore doubtful whether the term displacement should be applied to this condition. Associated with this condition of the uterus, the vaginal portion of the cervix may be conical and show a pin-hole os (fig. 29). Fig. 30 shows the appearance of the uterus in anteflexion. It is difficult

to say how frequent this condition is, as it is a mere question of degree of curvature. The term is usually applied to cases in which, with this alteration in the form of the uterus, the symptoms of dysmenorrhœa and sterility are present. Owing to the sterility, ante flexion is the characteristic displacement of nulliparæ as retroflexion is of multiparæ.

**Clinical Phenomena.**—Painful menstruation or dysmenorrhœa, dating from puberty, and sterility after marriage are the characteristic symptoms.

The *dysmenorrhœa*, as a rule, goes back to puberty, is present during the flow, and is sometimes of a spasmodic nature, suggestive of uterine contraction. These contractions are not related to expulsion of the uterine contents, for the menstrual blood comes away drop by drop. The spasm is probably of the circular muscular fibres, especially those round

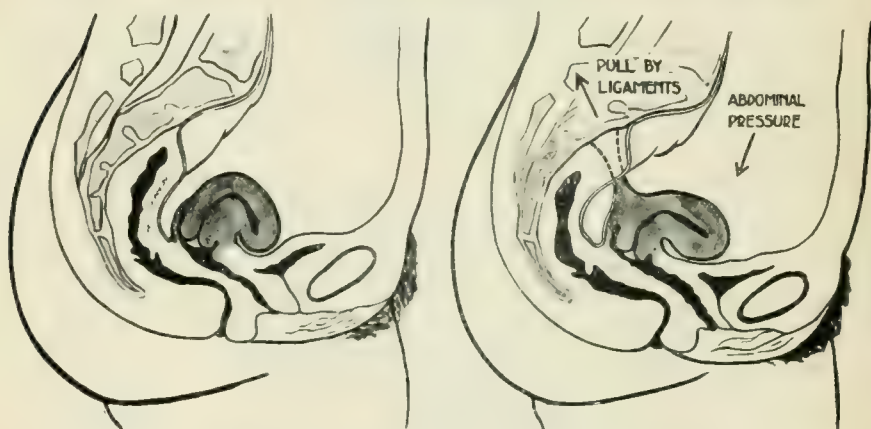


FIG. 31.—CONGENITAL ANTEFLEXION CONTRASTED WITH ACQUIRED, DUE TO UTERO-SACRAL CELLULITIS.

Note that in the former there is simply increase of normal flexion, while in the latter the uterus is retroposed and the utero-sacral ligaments palpable. The arrows show how the increased flexion is produced.

the os internum, and might be compared to the painful spasm of the anal sphincter present in fissure. The relief given in some cases by forcible dilatation, which is the recognised operative treatment, might be compared to that produced by stretching the sphincter.

The *sterility* has also been accounted for by the acute flexion or a pin-hole os; but as the spermatozoa are microscopic this explanation is not satisfactory. A pin-hole os may, however, retain secretions within the cervical canal which prevent fertilisation, and there is no doubt that dilatation or division of the cervix will in some cases remove sterility.

**Acquired Ante flexion.**—Acquired, or 'pathological ante flexion' as it is sometimes called, is the result of utero-sacral cellulitis. The uterus is drawn back as a whole in the pelvis (retroposed), the contraction of the

utero-sacral ligaments causing an increased pull on the uterus at the point of their insertion and a consequent increase in the amount of ante flexion (fig. 31). This condition may develop in a nulliparous woman, in which case the cellulitis is probably due to infection from the rectum. It is more common in parous patients, through infection from the genital tract.

*Symptoms.*—In this case the dysmenorrhœa does not go back to puberty but develops subsequently. The patient may be sterile or have had one child after whose birth the inflammation developed, producing subsequent sterility. As this displacement is simply one of the results of utero-sacral cellulitis, it will be referred to again under that subject.

#### RETROVERSION AND RETROFLEXION.

Retroversion is also congenital or acquired. The *congenital* form, of which fig. 32 is an illustration, occurs in about every fifth case of back-

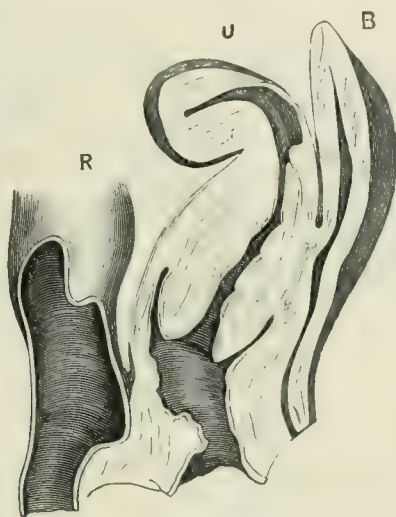


FIG. 32.—CONGENITAL RETROFLEXION.—(RUGE.)

R. Rectum ; U. Uterus ; B. Bladder. Note the thinning of the anterior wall of the uterus.

ward displacement. It is difficult to be sure that the condition is congenital. But should the uterus be found retroverted in a nulliparous patient without any history of inflammation or other cause sufficient to produce retroversion, should it measure only  $2\frac{1}{2}$  inches by the sound and on being replaced show a tendency to spring back again into its retroverted position, we are justified in assuming that the uterus has grown in this position.

Retroversion may also be the result of peritonitic adhesions in the



pouch of Douglas (fig. 33), in which case there will be a history of pelvic inflammation.

The usual cause, however, of retroversion is the *puerperal condition*. After delivery the uterus tends to lie retroverted, the round ligaments and utero-sacral ligaments which have become elongated during pregnancy being relaxed. Should these not regain their tone in the puerperium the uterus remains retroverted, and intra-abdominal pressure tends to keep up the malposition and to drive the fundus downwards between the relaxed utero-sacral ligaments, thus adding retroflexion to retroversion. Retroversion is thus the characteristic displacement of the multipara as antelexion is of the nullipara, and is present in from 20 to 25 per cent. of gynecological cases.

**Clinical Phenomena.**—As retroversion is best studied clinically, we



FIG. 33.—UTERUS RETROVERTED AND BOUND BACK BY PERITONIC ADHESIONS.—(WINCKEL.)

aa. Adhesions; b. Bladder; v. Vagina; u. Uterus; r. Rectum.

give in fig. 34 a representation of the condition found on bimanual examination, and describe retroflexion as being the final stage of backward displacement.

**Physical Signs.**—The cervix is directed downwards and forwards or directly downwards, the change in its direction bringing it nearer to the examining finger. The os is transverse because retroflexion usually implies parturition. When fissured it forms a gaping cleft, readily admitting the finger-tip. Sometimes the posterior lip is hypertrophied, the anterior feeling like a band stretched over it. The uterus is flexed on itself, so that the fundus lies in the pouch of Douglas, the acuteness of the angle varying in different cases. Its size is increased, the cavity measuring more than  $2\frac{1}{2}$  inches. As the flexion generally occurs in the puerperium while the uterus is still enlarged, it is hard to say whether the hypertrophy is the result of the displacement or due to its interfering



with the process of involution. There is usually no alteration in the thickness of the uterine wall at the angle. The utero-sacral ligaments are relaxed in retroversion, while in retroflexion the fundus is pressed down between them. The ovaries follow as a rule the displaced fundus, the thin infundibulo-pelvic ligament stretching more readily than the ovarian. Sometimes they are prolapsed below the fundus in the pouch of Douglas.

The bladder is not necessarily altered in position, but it has no longer the uterus resting upon it, so that the utero-vesical pouch becomes opened out. Though the retroverted fundus comes into relation with the wall of the rectum, the function of the latter is rarely interfered with.

Note that on bimanual examination of a case of retroversion only the

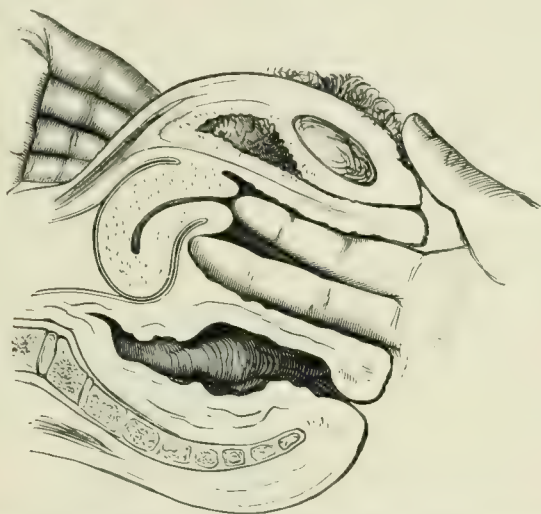


FIG. 34.—DIAGNOSIS OF RETROFLEXION BY BIMANUAL EXAMINATION.

cervix can be grasped; while a retroflexed fundus is recognised by the vaginal finger through the posterior fornix—more distinctly on rectal examination. The sound will pass backwards.

*Symptoms.*—These may be arranged in three groups according as they are more or less continuous, or related to the menstrual period, or connected with the function of reproduction.

The first includes pain in the back with a feeling of weight or discomfort in the pelvis, increased on exertion and by straining movements, *e.g.* defaecation. These symptoms are not due to the position of the uterus itself but to the pathological changes consequent on the displacement, such as uterine enlargement resulting from chronic metritis or fibrosis uteri, or associated with it, such as chronic peritonitis. Occasionally on

examining a patient with no pelvic symptoms the uterus is found to be retroverted, which shows that the backward position of the uterus does not of itself cause symptoms.

In the second group are included menorrhagia, dysmenorrhœa and sometimes leucorrhœa. These are due to secondary changes in the uterus or its appendages and will be referred to under these pathological conditions.

The third group, disturbances of the reproductive function, include sterility and the tendency to abortion. Retroversion is so common in multiparous patients that it is difficult to say how frequent such consequences are. We only see cases which have not conceived or in which abortion has occurred. The others naturally do not come under notice. The sterility may be due to a variety of causes, *e.g.* changes in the uterine mucosa or inflammation of the appendages. Reposition of the uterus does not always remove sterility, although occasionally conception follows on replacement. Abortion may be due to the condition of the uterine mucosa or to the uterus not replacing itself, which produces the condition known in Obstetrics as retroversion of the gravid uterus.

#### PROLAPSE.

Prolapse or descent of the uterus may be incomplete or complete. A patient with prolapse complains of 'something coming down'. If it



FIG. 35.—COMPLETE PROLAPSE OF THE UTERUS.

The position of the urethra (see fig. 36) is marked by the black probe projecting from it. The os externum is at the apex of the everted vagina.

'goes back' when she lies down, it is an incomplete prolapse; a complete prolapse does not 'go back'.

As the usual cause is the diminished support of the pelvic floor produced by the tearing of the fascial and muscular structures which meet in the perineal body, prolapse is, like retroversion, characteristic of multiparæ. It may develop within a few months after a confinement. More usually it is delayed till another factor operates, the relaxation of the tissues which occurs towards the change of life. It is in multiparæ over 40 years of age that it is usually found.

An important factor in prolapse is intra-abdominal pressure. The

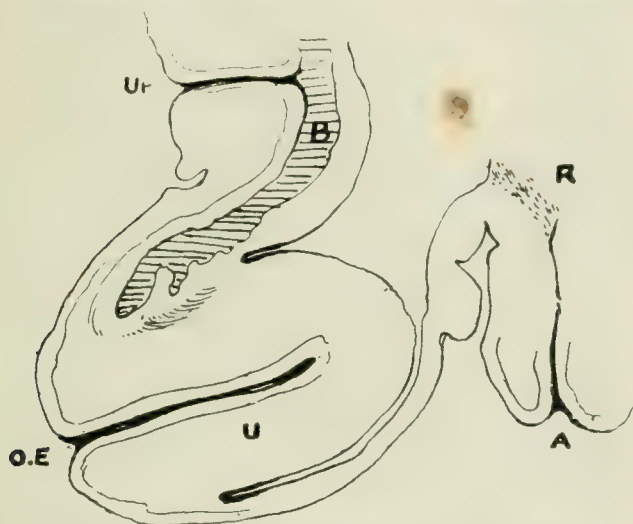


FIG. 36.—SECTION OF THE SPECIMEN SHOWN IN FIG. 35.

B. Bladder; Ur. Urethra; U. Uterus; O.E. Os Externum; R. Rectum; A. Anus. Note that the vagina is completely everted anteriorly, while a small pouch is present posteriorly; that the bladder prolapses with the cervix; that the uterus is retroverted; that the rectum is not displaced; also the disposition of the peritoneum.

uterus does not fall down as the term prolapse suggests, but is forced downwards by whatever increases the intra-abdominal pressure, *e.g.* any straining movement, as coughing. It thus resembles a hernia. Berry Hart described the condition as Sacro-pubic Hernia—see fig. 38.

**Clinical Phenomena.**—The condition found in complete prolapse may be thus described. A tumour is found at the vaginal orifice, covered with vaginal mucosa (figs. 35–37). On carrying the finger round its base no depression is felt anteriorly, while posteriorly the finger may pass in for about an inch. The vaginal cavity has disappeared; the tumour is the everted vagina, as distinct from a tumour coming down through

the vaginal orifice. In the centre of its base anteriorly the urethra is found, while at its apex is the opening of the os externum (fig. 35). Around this may be ulcerated patches due to excoriations (fig. 37); sometimes the whole surface is paler and drier, more like skin in its character, the vaginal mucosa having been altered by being exposed.

Passing from the surface of the protruded mass to its contents we find, on introducing the sound through the urethral orifice, that the bladder descends into the anterior segment of the protruded mass (fig. 36). The sound,



FIG. 37.—COMPLETE PROLAPSE WITH ULCERATION ROUND THE OS.

Photograph from living subject.

when passed through the os externum, goes in for more than  $2\frac{1}{2}$  inches, sometimes for 3 or 4, and in a backward direction, showing that the uterus is both retroverted and enlarged. The position of the fundus is determined by introducing the index finger into the rectum so as to feel where the point of the sound lies. Further, the finger in the rectum shows that the rectum, unlike the bladder, has not prolapsed. To determine the course of the peritoneum, a frozen section is required. Schütz's section (fig. 38) shows its disposition; also the anatomical relations of the vaginal walls, uterus, bladder and rectum.

The position of the bladder and relation of the peritoneum have a

very important bearing on amputation of the cervix, which is often necessary to reduce the size of the uterus. It is noteworthy that the prolapsing uterus follows the axis of the pelvis; anteverted at the brim it becomes retroverted at the outlet. Hence retroversion and a moderate degree of prolapse are associated, while in complete prolapse the uterus is almost always retroverted. The ovaries and Fallopian tubes descend to a certain extent along with the uterus.

*Symptoms.*—The chief clinical phenomena are the presence of the



FIG. 38.—THE HERNIAL NATURE OF PROLAPSUS UTERI.—(BERRY HART.)

a. Peritoneum; b. Bladder; c. Uterus; d. Anterior vaginal wall; e. Anterior rectal wall; f. Perineum; g. Posterior vaginal wall. This drawing is based on Schütz's frozen section of a case of Prolapsus Uteri, the intestines being removed, and the structures displaced downwards (analogous to the coverings of a hernia) shaded black.

swelling at the vulva and the discomfort which it causes in walking. It is surprising how little disturbance is caused in elderly patients by this marked displacement of the pelvic organs. Displacement of the bladder may cause frequency of micturition and sometimes an inability to pass water until the swelling is replaced. There may be leucorrhœa in the early stages from the irritation of the vaginal mucosa, and there is sometimes menorrhagia from an enlarged uterus. Excoriation of the everted surface may also cause bleeding with purulent discharge.



## INVERSION.

In inversion the uterus is turned inside out so as to form a polypoidal projection into the vaginal canal. Its peritoneal surface is converted into a cup-shaped hollow; its mucous membrane becomes everted so as to lie exposed on all sides in the cervix and vagina.

Inversion may arise in the puerperium or be secondary to intra-uterine tumours growing from the fundus. The former is the more frequent form, and fig. 39, taken from Crosse's classical monograph on the subject, shows the relation of the parts. From this specimen the condition found

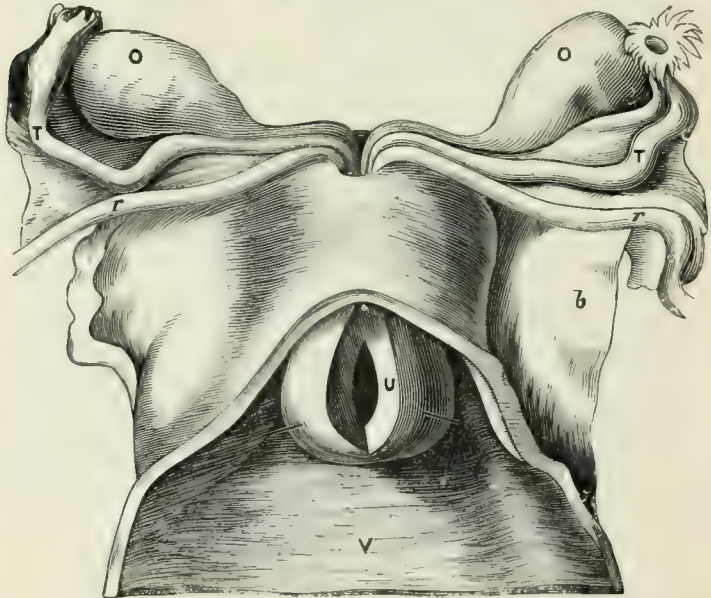


FIG. 39.—INVERSION OF UTERUS.—(CROSSE.)

The inverted uterus (U) lying in the vagina (V) is cut open to show the peritoneal sac, which does not contain the ovaries (O); bristles are passed into the uterine orifices of tubes. *b*. Broad and *r*. round ligaments; T, tube.

on bimanual examination will be evident. A tumour is found dilating the cervical canal or lying in the vagina which, if inversion be recent, has a more rounded form and is of softer consistence and a deeper red colour than a pedunculated fibroid. The characteristic feature is that the body of the uterus is not found bimanually, the inverted cup of peritoneum taking the place of the fundus. After the inversion has existed for some weeks, the surface of the tumour may undergo all the changes of a tumour with a constricted base and exposed surface. It may become ulcerated and even gangrenous. Fig. 40 is a section of an inverted uterus



removed by supra-vaginal hysterectomy in which the exposed surface of the uterus was devoid of mucous membrane, being covered with a dense layer of fibrous tissue without any epithelial covering. The muscular fibre showed marked fatty degeneration, the muscle towards the peritoneal surface being entirely replaced by fat.



FIG. 40.—SECTION OF INVERTED UTERUS REMOVED BY SUPRA-VAGINAL HYSTERECTOMY TWO MONTHS AFTER CONFINEMENT.

There had been no hæmorrhage or other symptoms during the puerperium. Note that the appendages do not descend into the peritoneal cup, and that the muscular wall of the uterus at the bottom of the latter is replaced by a folded layer of fatty tissue.

### AFFECTIONS OF THE CERVIX.

Before considering affections of the mucous membrane of the uterus, and of its muscular wall, we must make a digression to look at that part of the uterus which is known as the Cervix Uteri. It differs from the body of the uterus anatomically, physiologically and pathologically.

**Anatomy.**—The cervix projects within the vagina, forming the vaginal portion, in contrast to the supra-vaginal portion above the vagina. This is free for one-third in front—the shallow anterior fornix, and for two-thirds behind—the deeper posterior fornix. In front the upper two-thirds of the cervix are in relation to the cellular tissue which separates it

from the bladder, the peritoneum not covering the cervix anteriorly. Behind, the upper third of the cervix is covered with peritoneum. Taking the length of the cervix roughly as 1 inch, the finger placed in the anterior fornix is  $\frac{2}{3}$  of an inch distant from the peritoneal cavity, while in the posterior fornix it is only separated from it by the thickness of the vaginal wall. At the sides the cervix is free to the depth of the lateral fornices, about  $\frac{1}{2}$  inch, above which lies the cellular tissue of the base of the broad ligaments (see fig. 7). The relation of the cervix to the cellular tissue will be referred to again when we consider Cellulitis, here we only note how the anatomical relations favour the development of this condition. It is through the cervical canal that infection takes place, the tear

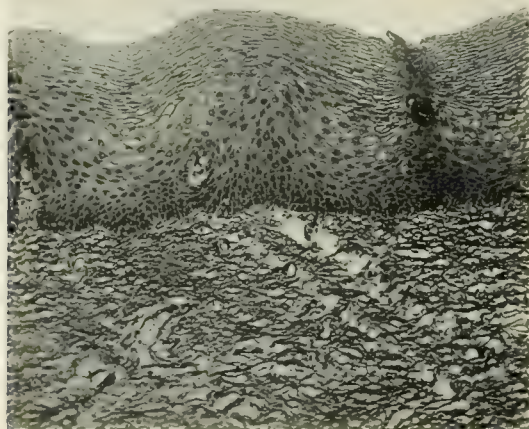


FIG. 41.—MUCOUS MEMBRANE OF VAGINAL PORTION OF CERVIX (H.P.).

Note the stroma of dense connective tissue containing blood-vessels. This is covered with a many-layered squamous epithelium, the cells of the deeper layers being polygonal, those of the superficial layers flattened. There are no glands. The structure is the same as the mucous membrane of the vagina.

of the cervix favouring the entrance of micro-organisms. Without a tear they may enter, as is seen in cases of gonorrhœal infection; for, while the gonococcus cannot penetrate the armour of squamous epithelium on the vaginal aspect of the cervix, it penetrates the thin epithelial lining of the cervical canal as easily as that of the urethra.

The os externum differs in a nullipara and a multipara. In the former it is a mere dimple and has been compared to the feeling of the tip of the nose when pressed by the finger; seen with the speculum it is circular, with an unbroken margin (Plate II.). In the latter it is transverse. If the laceration has healed perfectly, the change in form of the os remains as evidence of parturition.

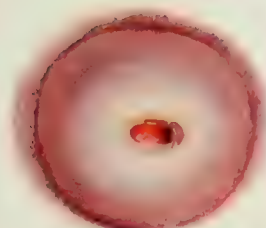


FIG. 1.

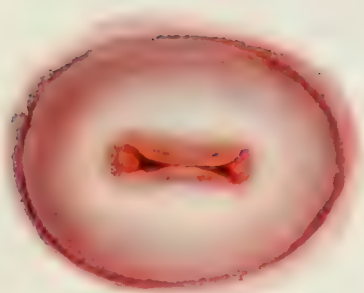


FIG. 2.

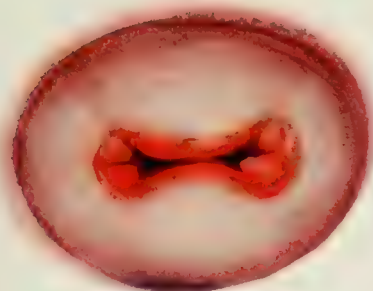


FIG. 3.



FIG. 4.

THE OS EXTERNUM AS SEEN IN THE SPECULUM.

FIG. 1.—Nulliparous os. FIG. 2.—Multiparous os. FIG. 3.—Multiparous cervix with slight catarrh.  
FIG. 4.—Same with double laceration, lips drawn apart, and advanced catarrh.



The cervical canal appears fusiform on section due to the contraction at the os externum below, which separates it from the vaginal canal, and at the os internum above, which separates it from the cavity of the body (fig. 21). At the os externum there is an abrupt transition from

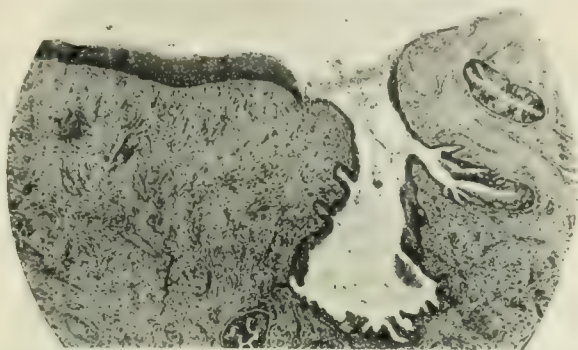


FIG. 42.—MUCOUS MEMBRANE OF CERVIX AT OS EXTERNUM (L.P.).

To the left is seen the stratified squamous epithelium of the vaginal portion which ceases abruptly at the os externum: then comes one of the folds of the mucosa of the cervical canal, lined with a single layer of columnar epithelium.

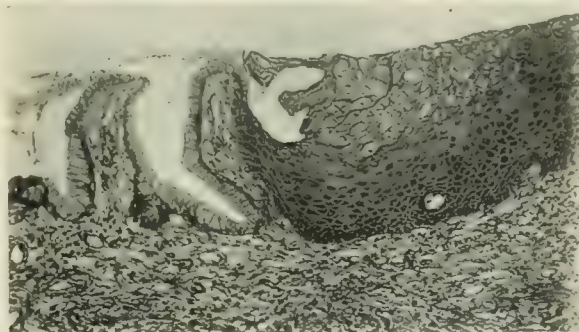


FIG. 43.—MUCOUS MEMBRANE OF CERVIX AT OS EXTERNUM (H.P.).

To the right is the stratified squamous epithelium shown in fig. 41: to the left, the mucosa of the cervical canal, covered with a single layer of tall columnar epithelium. The nuclei of these cells lie towards the base, the free part of the cell being distended with mucus.

the squamous epithelium of the vagina (fig. 41) to the columnar epithelium of the mucosa of the cervical canal (figs. 42, 43). The surface of the latter is thrown into folds consisting of a mesial ridge with lateral branches to which the name of *arbor vitae* has been fancifully applied.



The epithelium consists of a single layer of columnar cells ciliated on the ridges. The ducts of the racemose glands, which secrete the characteristic mucus of the cervix, open on it.

Thus, microscopically, the cervix is covered on its vaginal aspect by a squamous epithelium arranged in several layers, while internally the canal is lined by columnar epithelium. The thicker layer of squamous epithelium gives the vaginal aspect a pale appearance in contrast to the rosy red of the cervical canal (Plate II.). This difference of epithelium

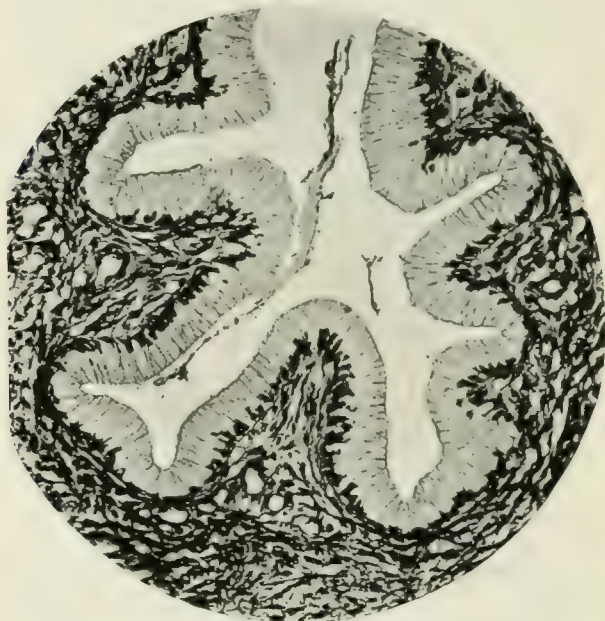


FIG. 44. —CERVICAL GLAND.

High-power view showing the racemose character; the lining of a single layer of tall columnar epithelium, each cell with its nucleus at the base, and all set upon a basement membrane. In the lumen lies mucus secreted by these cells. Contrast with glands of the endometrium, fig. 74.

is of importance in relation to the pathological appearance produced in cervical catarrh, and the two-fold origin of cancer of the cervix.

The glands lining the cervical canal are racemose (fig. 44), not tubular as in the body of the uterus; and the character of the secretion is different, thick tenacious mucus, resembling unboiled white of egg, being characteristic of the cervix.

*Physiologically*, the cervix forms the canal of communication between the vagina and the body of the uterus. Its mucosa simply secretes mucus, while that of the body of the uterus forms a decidua. In



pregnancy, as in menstruation, the cervix plays a passive rôle, taking no part in the active changes which the uterine mucosa undergoes.

*Pathologically*, the cervix differs from the body of the uterus, for those tumours which are frequent in the body are rare in the cervix, and *vice versâ*. Of connective-tissue tumours, the simple fibroma and the malignant sarcoma are more frequent in the body; while of epithelial tumours, the simple mucous polypus and the malignant carcinoma are rarer in the body than in the cervix. Besides these neoplasms three affections of the cervix call for consideration here, Hypertrophy, Laceration and Cervical Catarrh.

#### HYPERTROPHY OF THE CERVIX.

Hypertrophy affects the vaginal portion or the supra-vaginal portion.

Hypertrophy affecting *the vaginal portion* alone is a rare condition. It is a true primary hypertrophic growth, found in nulliparæ—cause



FIG. 45.—HYPERTROPHY OF VAGINAL PORTION OF CERVIX.

Note that the fornices are not obliterated as in Prolapse.

unknown (fig. 45). It is diagnosed by the unusual length of the cervix—both the fornices being at the normal level. The uterine cavity is increased in length, but the fundus (felt *per rectum*) is not prolapsed.

Hypertrophy affecting especially *the supra-vaginal* portion is part of the general enlargement which the uterus undergoes in cases of prolapse (see figs. 35–38).

#### LACERATION OF THE CERVIX.

We have already mentioned the frequency with which patients trace back the commencement of their illness to a confinement or miscarriage. On asking why labour and abortion are so often the starting-

point of female complaints, we find that the tear of the cervix produced by the passage of an ovum, or of the foetal head, literally opens the door to a variety of lesions. Cervical catarrh is favoured if not initiated by it. Further, the raw surface admits organisms which lead to chronic inflammation of the cellular tissue; and sub-involution is kept up indirectly by the effect which cellulitis has on the vascular and lymphatic circulation of the uterus.

It was Emmet of New York who first drew attention to the importance of lacerations, introducing the operation for their repair known as Emmet's operation. For many years the importance of the lesion was much exaggerated, or at least the treatment by operation became too prominent, until abundant proof was given that the repair of the laceration did not cure the chronic ailments consequent on it. To close a



FIG. 46.—SINGLE LACERATION.—(EMMET.)

The flaps are held apart with a double tentaculum.

laceration was compared to shutting the stable door after the steed was stolen. While, however, a wider experience has relegated to the background the operative treatment of this lesion, it has not affected its etiological significance. Though there is no good in shutting the door after the steed is stolen, that does not affect the fact that unless the door had been opened the horse would not have disappeared.

In determining whether a patient has been formerly pregnant, the condition of the cervix thus comes to be of the first importance, because it is affected even by abortion. While the foetal head leaves its mark on the perineum, an ovum will leave it on the cervix (Plate II.).

Lacerations are most frequently found to the front and left side (fig. 46), perhaps because the cervix in labour gives way most readily over the occiput of the foetal head. They may be multiple or stellate (fig. 47). Seen with the speculum there is eversion of the mucosa of the

cervical canal, as occurs in ectropion of the eyelid; and the mucosa round the tear undergoes changes to be described under cervical catarrh (Plate II.). To determine the depth of a laceration, the pouting lips of the cervix must be rolled in by volsellæ until the cleft disappears.

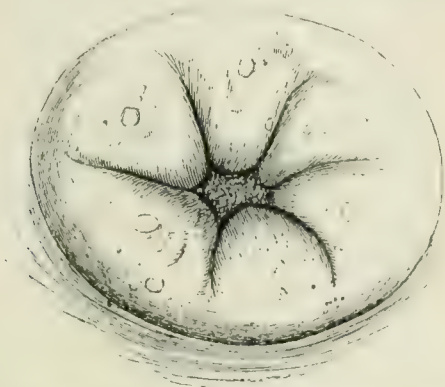


FIG. 47.—MULTIPLE OR STELLATE LACERATION.—(EMMER.)

#### CERVICAL CATARRH.

The physical signs of cervical catarrh deal especially with the changes round the os externum as seen with the speculum.

Round the os externum is seen a red granular surface which bleeds easily. On account of these two characteristics it used to be considered as an ulcerated surface, and the term 'ulceration of the cervix' came into Gynecology. This not only gave the lesion an undue importance in the patient's mind, but the erroneous pathology led to pernicious treatment. The examination of tissue cut out in operating on the cervix, instead of material derived from the post-mortem room, showed that the apparently raw surface was covered by a single layer of epithelium, that its granular appearance was due to foldings of the surface, and the tendency to bleed to the ease with which the delicate epithelium might be brushed off. The red area round the os is therefore not ulceration but a glandular new formation (see Plate II. and figs. 48, 49). It is covered with a single layer of columnar epithelium, not with granulation tissue. It is produced by the extension of the epithelium of the cervical canal on to the vaginal aspect of the cervix, replacing the stratified squamous epithelium normally present there (fig. 48).

To these red areas the term 'erosion' has been applied, and two forms of cervical erosion are described: (1) The papillary erosion, a condition in which the surface is thrown into a series of papillæ, each covered with a single layer of columnar epithelium, and there are few

glands (fig. 49); (2) glandular erosion, a condition where the surface is smoother but in which a great many cervical glands are present (fig. 48).

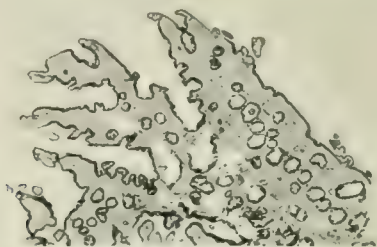


FIG. 48.—CERVICAL EROSION OR CATARRHAL PATCH.

Section of the vaginal portion of the cervix, showing the absence of stratified epithelium and the surface covered with a single layer of columnar epithelium which has extended from the cervical canal. Glands are also present, some of them dilated, and the surface is thrown into papillary folds. This is a mixed papillary and glandular erosion.



FIG. 49.—VAGINAL PORTION OF CERVIX—PAPILLARY EROSION.

High-power view showing the papillary projections covered with the single layer of columnar epithelium, the cervical glands in section in the stroma; the thick mucus secreted by these glands is seen clinging to the surface of the projections.

The term erosion, however, suggests an eroded surface, while this is covered with epithelium. 'Catarrhal patch' is more appropriate, as the red areas are patches of vaginal mucosa which have taken on the characters of the catarrhal mucosa lining the cervical canal (fig. 49).

In cervical catarrh there is thus an extension of the cervical canal mucosa beyond the external os on to the vaginal portion of the cervix.

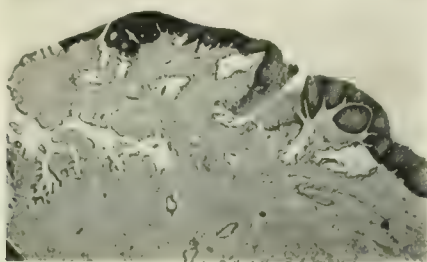


FIG. 50.—EROSION OF THE CERVIX UNDERGOING CURE.

The vaginal aspect has again become almost completely covered with squamous epithelium. Some of the cervical glands still remain underneath the thick epithelial covering. If the mouths of these glands become blocked, Nabothian follicles form (fig. 51). Compare with fig. 52.

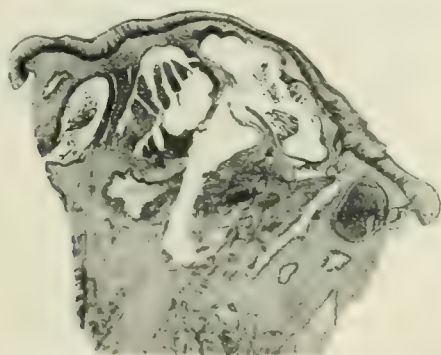


FIG. 51.—VAGINAL ASPECT OF CERVIX NABOTHIAN FOLLICLES.

Note the covering of squamous epithelium and the large cystic spaces underneath. These are obstructed cervical glands left behind after healing of a cervical erosion.

In this situation the tissue is subjected to friction against the vaginal walls and to the irritation of the acid vaginal secretion. The result is that the epithelium on the surface and lining the glands becomes catarrhal and the stroma hyperæmic.

In the process of natural cure the squamous epithelium again grows over the catarrhal patch, replacing the columnar epithelium (fig. 50).



In this process the mouths of any cervical glands present in the area of the erosion become obstructed by the squamous epithelium. The glands belonging to these ducts continue to secrete, with the result that small retention cysts are produced (fig. 51). These protrude on the surface of the vaginal portion of the cervix as small rounded elevations, and to them the name 'Nabothian follicle' is given (fig. 52). Their presence is always an indication of a previous cervical catarrh. During this process of cure the connective tissue of the cervix becomes dense and

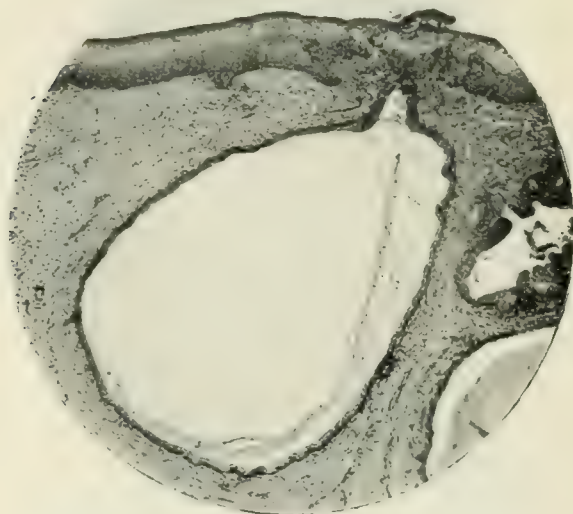


FIG. 52.—NABOTHIAN FOLLICLE (H.P.).

Underneath the stratified squamous epithelium is a large space lined with columnar epithelium and filled with mucus. The gland duct can still be traced.

cicatricial in character, so that the whole cervix becomes larger and firmer than normal.

**Clinical Phenomena.**—As regards its *etiology*, in most cases the starting-point of a cervical catarrh is a laceration of the cervix produced at the time of labour. As the result of this laceration the lips of the cervix become everted, the delicate epithelium of the cervical canal is exposed to the irritation of the vaginal walls, and this results in its extension on to the vaginal aspect. The condition is also met with, however, in nulliparous women. In some of these cases it is secondary to a gonococcal infection, but in others no such factor is present, and in these the cervical catarrh is very often associated with a catarrh of the endometrium.



Passing now to *symptoms*, the prominent symptom in most cases is leucorrhœa. This is always most abundant just before and immediately after menstruation. The discharge is as a rule thick and tenacious in character. It is seldom blood-stained. In addition the patient often suffers from menorrhagia owing to an associated endometritis. Pain in the back and symptoms of anaemia and dyspepsia are frequently present.

*Physical Signs.*—Round the edges of the laceration, if such be present, or round the external os, the finger can detect the soft velvety character of the surface of the catarrhal patch. The diagnosis, however, is only confirmed by inspection of the cervix, and this is best carried out with the ordinary Sims' speculum, the patient lying in the Sims' position.

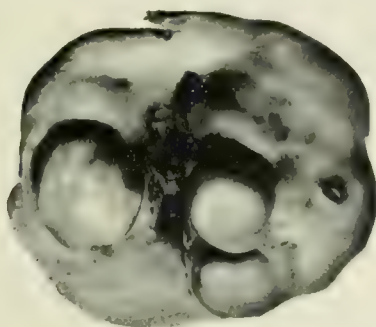


FIG. 53.—CERVIX REMOVED BY AMPUTATION, CONTAINING LARGE CYSTS RESULTING FROM ADENOMATOUS OVERGROWTH OF THE GLANDS.

The characteristic red colour of the catarrhal patch is visible, and on touching the surface slight bleeding may result.

In chronic cervical catarrh, after healing of the catarrhal patches has occurred, the striking features on vaginal examination are the enlargement and the hardness of the vaginal portion of the cervix. Situated immediately under the surface, the finger can detect hard, round, shot-like bodies—these are Nabothian follicles. Sometimes the cervix shows distinct cysts (fig. 53). Such cases may present some difficulty in differential diagnosis from commencing cancer of the cervix. The chief distinguishing character is that in a chronic cervical catarrh with Nabothian follicles the surface is hard and irregular; whereas in cancer of the cervix the surface is always friable, and examination with the finger causes bleeding. If doubt still exists, a piece of the suspicious cervix should be excised and submitted to microscopic examination.

Passing now to **tumours of the Cervix**, we consider those related to

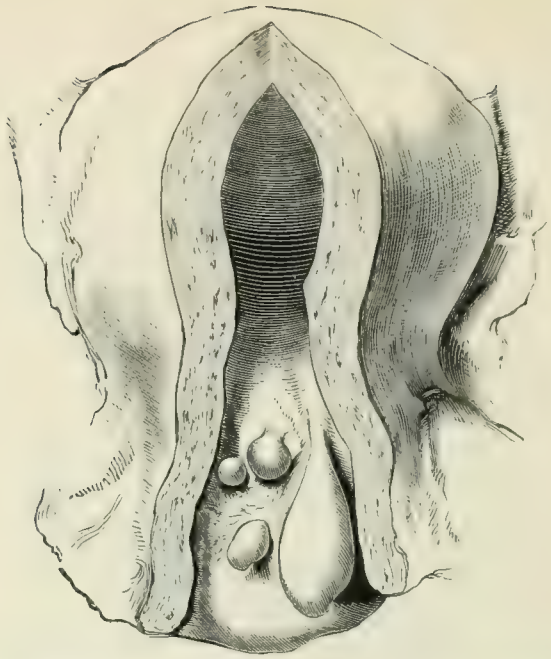


FIG. 54.—UTERUS LAID OPEN, SHOWING MUCOUS POLYPI SPRINGING FROM THE CERVIX.

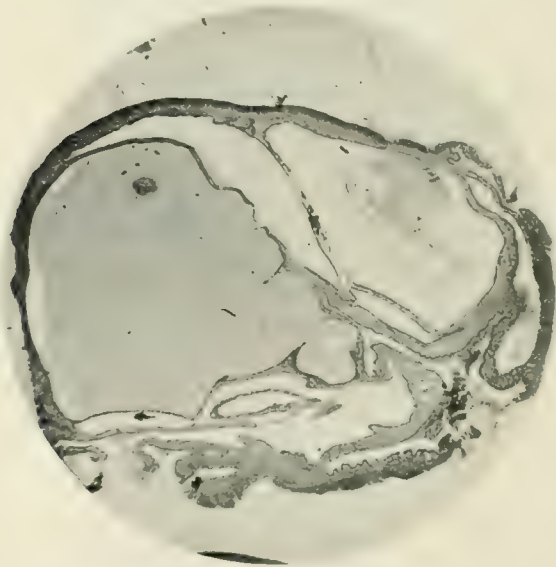


FIG. 55.—MUCOUS POLYPUS OF CERVIX (L.P.).

Note the large spaces lined with columnar epithelium and containing secretion.  
It is a simple adenoma.

its characteristic epithelium, the simple Mucous Polypus and the malignant Cancer. The less frequent Fibroid and Sarcoma will be best considered along with the similar tumours of the Body of the Uterus.

**Mucous Polypi.**—From the os may be seen protruding small, bright red, soft, very vascular growths from the size of a wild strawberry to a cherry—mucous polypi (fig. 54). They are single or multiple and more common in elderly women. They are covered with columnar or in part with squamous epithelium, and consist of a connective tissue stroma

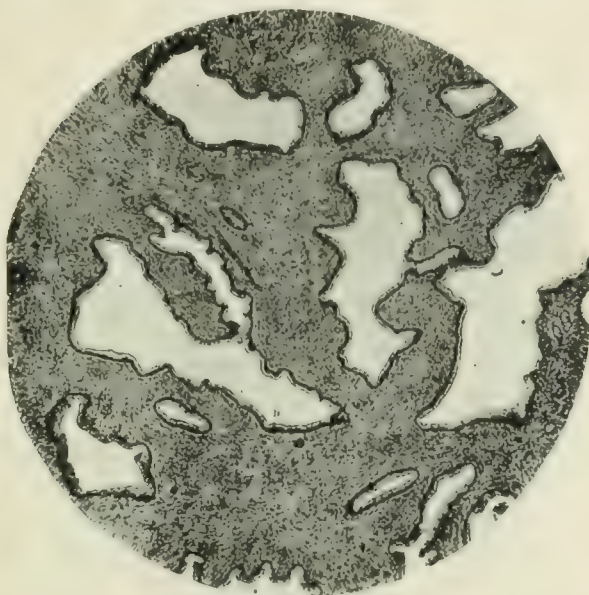


FIG. 56.—FIBRO-ADENOMATOUS POLYPUS OF CERVIX.

There is more connective tissue between the spaces than in fig. 55.

Note the characteristic cervical epithelium.

containing numerous glands lined with columnar epithelium (fig. 55). The stroma is very vascular. Another variety is the fibro-adenomatous polypus, which contains more fibrous tissue (fig. 56).

*Symptoms.*—These are hæmorrhage and leucorrhœa. The bleeding may be slight, a blood-stained mucus, or so free as to suggest malignant disease.

#### CANCER OF THE CERVIX.

**Origin and Forms.**—We have seen that there are two types of epithelium in the normal cervix,—the stratified squamous epithelium

covering the vaginal aspect and the single layer of columnar epithelium lining the cervical canal, and in connection with the latter the racemose cervical glands situated in the substance of the mucosa. Different forms of cancer may therefore develop in this situation. If the disease arises on the vaginal aspect of the cervix it takes the form of a *squamous epithelioma*, a growth of the same nature as that commonly found in the lip. If the disease commences within the cervical canal it takes the form either of a *columnar* or spheroidal-celled *carcinoma*, developing from the surface epithelium, or of a glandular or *adeno-carcinoma* arising from the epithelium of the cervical glands. The relative frequency of these

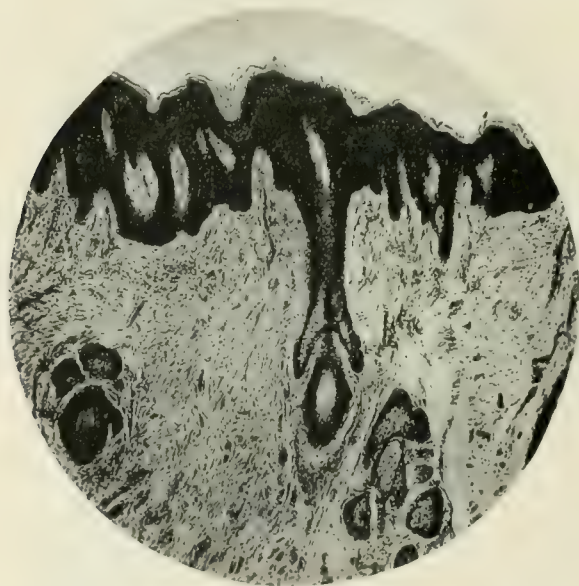


FIG. 57.—CANCER OF THE CERVIX.

This is a malignant epithelioma arising from the stratified squamous epithelium of the vaginal portion. Note how the epithelium dips down in finger-like processes and in the deeper portions of the section forms cell-nests.

types of cancer in the cervix is not easy to determine, because in their later stages they are difficult to distinguish from each other, both clinically and pathologically. In their initial stages they can be easily distinguished, and we shall describe each in detail.

**Squamous Epithelioma.**—Like similar growths elsewhere, this begins in the deeper layers of the stratified epithelium, where the cells are actively growing and are in contact with the subjacent connective tissue. The cells proliferate rapidly and extend downwards into the subjacent



stroma in the form of solid plugs (figs. 57-58). The cells at the periphery of each of these plugs proliferate outwards; those in the interior become compressed and flattened like the cells on the surface. These plugs when cut in transverse section thus have the characteristic appearance to which the name 'cell nests' is given. These cell-nests are not so abundant in the cervix as in other situations, such as the lip, but they are occasionally seen. Where the epithelial invasion is taking place there is a reaction on the part of the connective tissue. The vessels are dilated and there is an accumulation of leucocytes and small connective-tissue cells. As the growth extends in this way into the substance of



FIG. 58.—SQUAMOUS EPITHELIOMA OF THE CERVIX.

Note same characters as in fig. 57.

the cervix the surface undergoes breaking-down and ulceration. This ulcerated area usually becomes invaded by saprophytic organisms which flourish on the breaking-down tissue. These organisms by their growth give to the discharge a peculiarly foetid odour. The ulcer so produced has all the characteristics of a similar ulcer elsewhere. It has hard indurated edges and an irregular, hard, friable surface which bleeds readily.

In some cases, instead of ulceration occurring and the cervix gradually being eaten away, the epithelium and subjacent connective tissue proliferate outwards into the vaginal cavity in the form of great warty masses which may come to fill up the entire roof of the vagina. This

is known as the 'cauliflower' form of cancer (figs. 59-60). At the edge of the growth extension takes place in the same way as in the ulcerative form.



FIG. 59.—UTERUS LAID OPEN TO SHOW EPITHELIOMA OF ANTERIOR LIP.

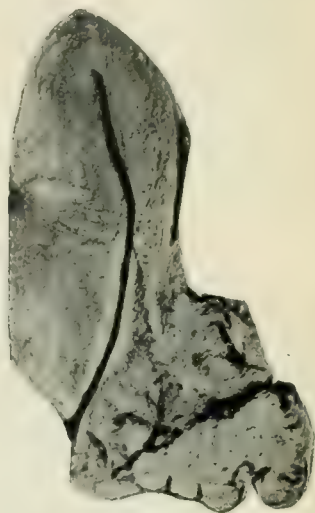


FIG. 60.—SAME IN SECTION TO SHOW THE CAULIFLOWER-LIKE APPEARANCE OF THE GROWTH IN THIS CASE.

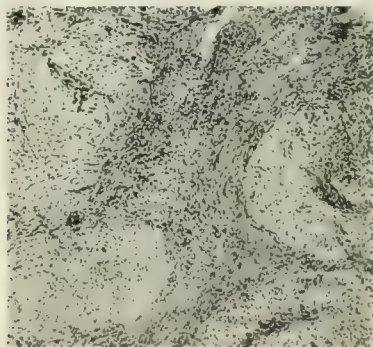


FIG. 61.—COLUMNAR CELL CARCINOMA OF CERVIX.

This type has its origin in the surface epithelium of the cervical canal or the epithelium of the glands. The glandular arrangement is not present, the malignant cells forming solid masses which penetrate into the connective tissue.

**Columnar-Celled Carcinoma and Adeno-Carcinoma.**—In this type the cancerous growth begins within the cervical canal, arising either



from the surface columnar epithelium or from the epithelium of the cervical glands. In the solid columnar carcinoma (figs. 61, 62) the epithelioma eats its way into the substance of the mucosa and into the deeper parts of the substance of the cervix, in very much the same way as the squamous epithelioma does on the vaginal aspect. In the adeno-



FIG. 62.—COLUMNAR CELL CARCINOMA OF CERVIX.

High-power view of fig. 61.

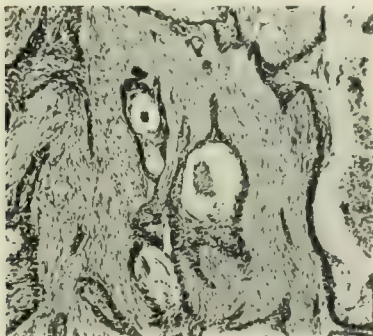


FIG. 63.—ADENO-CARCINOMA OF THE CERVIX.

This has its origin in the glands of the mucous membrane of the cervical canal.

Note that the glandular arrangement is more or less maintained, but that the epithelium is proliferating out in masses into the stroma.

carcinoma (fig. 63) the epithelium of the glands proliferates out through the basement membrane and into the surrounding stroma, so that the gland lumen becomes surrounded by many layers of cells. After a time the lumen may be entirely obliterated and all that is seen on section are the solid masses of columnar cells. The naked-eye features of both

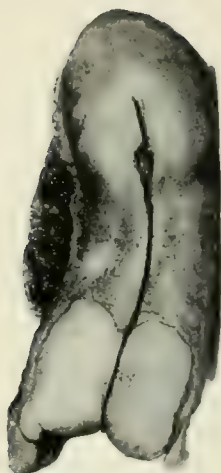


FIG. 64.—CANCER OF THE CERVIX.

Both lips are involved by the new growth, which has not broken down.

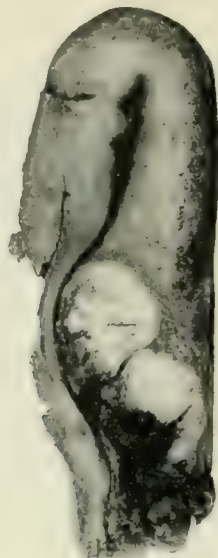


FIG. 65.—CANCER OF THE CERVIX.

Only one lip is involved, but the condition is more advanced, with breaking-down, than in fig. 50.



FIG. 66.—VERTICAL MESIAL SECTION OF PELVIS.

From case of Carcinoma of Vagina and Uterus. *d.* body of uterus ;  
*f.* points to vagina eroded by disease ; *g.* bladder.

are similar and are shown in figs. 64 and 65. In one case, both lips are involved and there is no breaking-down; in the other, the growth is limited to one lip but is more advanced.

In both types ulceration soon occurs on the surface; and the disease extends downwards to the external os and over the vaginal aspect, so that in the later stages it is clinically indistinguishable from the squamous epithelioma. It seldom spreads upwards beyond the internal os.

*Mode of Extension.*—Whether beginning as epithelioma or adenocarcinoma the disease extends locally by gradually spreading over the vaginal aspect of the cervix, and outwards into the cellular tissue. By the time this is reached the greater part of the cervix may have been destroyed by the ulcerative process, so that it is represented simply by a hard cancerous excavation in the vaginal roof (fig. 66). In the vaginal

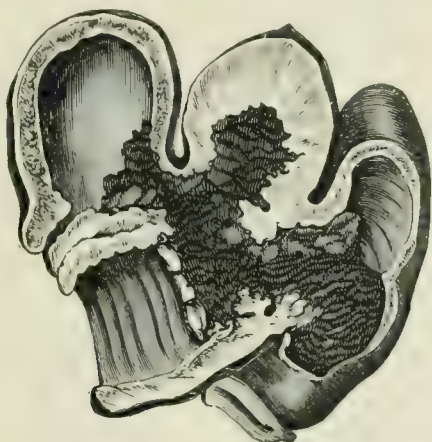


FIG. 67.—CANCER OF CERVIX WHICH HAS PRODUCED VESICO-VAGINAL AND RECTO-VAGINAL FISTULÆ.—(FARRE.)

wall the growth may extend deeply and eat its way into the bladder in front, producing a vesico-vaginal fistula, or into the rectum posteriorly, producing a recto-vaginal fistula (fig. 67).

In addition to this continuous extension, there is also infection through the lymphatics. The lymphatic vessels from the cervix run through the cellular tissue at the bases of the broad ligaments to reach the hypogastric glands situated round the iliac vessels (fig. 68). Some of the cancer cells are arrested in the vessels in the broad ligaments, and in this situation it is common to find a mass of cancerous tissue. This extends outwards towards the sides of the pelvis, and frequently comes to involve the base of the bladder and the ureters. When the latter are involved the lumen may be obstructed, leading to hydronephrosis, which may later develop into a pyonephrosis. Hence chronic uræmia is not un-

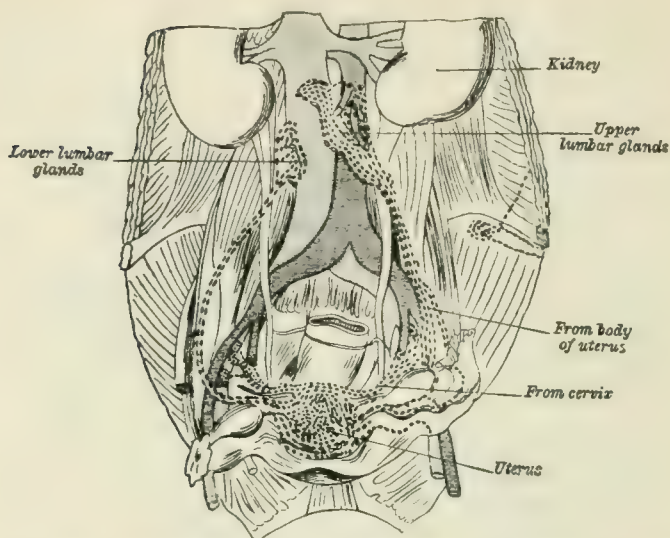


FIG. 68.—LYMPHATICS AND LYMPHATIC GLANDS OF PELVIS AND LOWER PART OF ABDOMEN.—(POIRIER.)

Note the hypogastric glands round the iliac vessels receiving the lymphatics from the cervix, and the lumbar glands receiving those from the uterus.



FIG. 69.—KIDNEYS AND URETERS, FROM A CASE OF CANCER OF UTERUS WITH UREMIC CONVULSIONS.



common in advanced cancer and is frequently the cause of death (fig. 69).

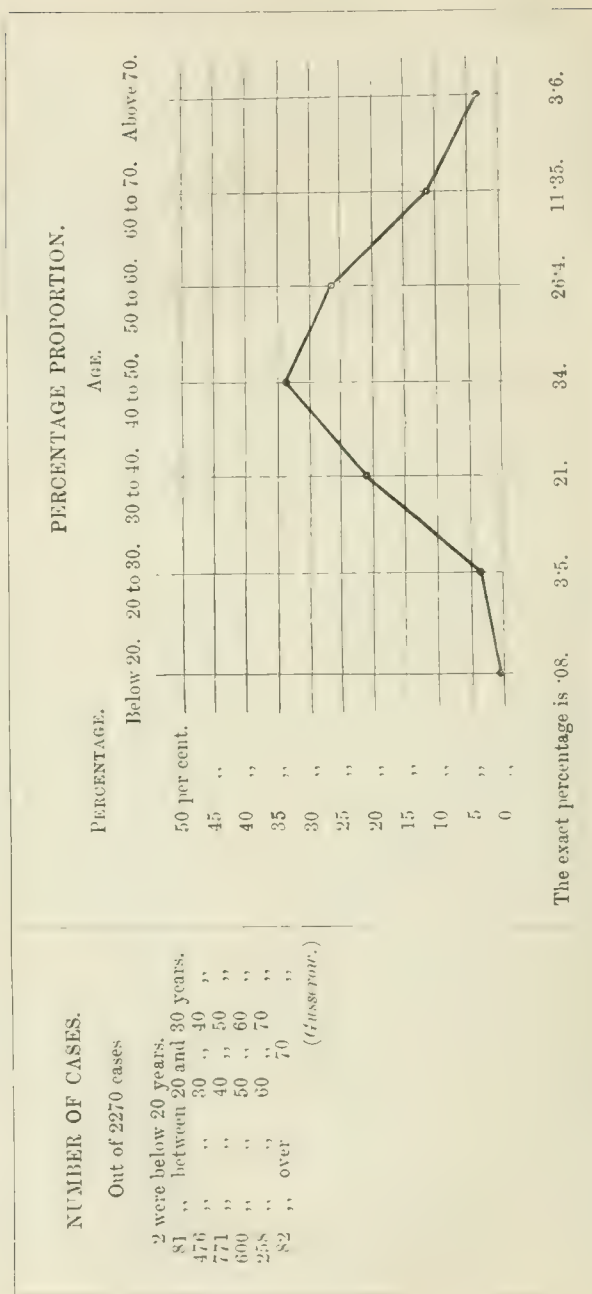
There is some difference of opinion as to the stage at which the hypogastric glands are involved and also as to the frequency of their involvement. In early cases definite secondary deposits have been found in them and in other cases much more advanced they have been quite unaffected. Mere enlargement of the glands does not indicate secondary deposit, because many such enlarged glands have been demonstrated to be entirely inflammatory in nature; and on the other hand, a gland apparently normal in size may have a commencing secondary deposit in it. From the practical point of view, therefore, it is well in operating for cancer of the uterus to remove as much of the cellular tissue with its lymphatics and glands as possible, and this is the object aimed at in the modern operation of abdominal pan-hysterectomy by Wertheim's method. The lumbar glands round the aorta may be secondarily involved after the hypogastric ones. Complete removal of these lumbar glands is, however, not possible.

In addition to this direct spread to tissues in the neighbourhood, metastatic deposits may occur in more distant organs, the liver being most frequently involved.

**Clinical Phenomena.**—The fact that one woman of every eight who has reached the age of thirty-five dies of cancer, the common seat of the disease being the uterus, makes the recognition of cancer clinically one of the most important for the Gynecologist to-day. Until more is known of the nature of this disease we must rely on operative measures for its treatment. Successful operation depends on early recognition, hence the diagnosis of cancer in its early stage is of the first importance for the saving of life.

**Etiology.**—The circumstances predisposing to its development are age and depreciation of the vital powers. The influence of age is shown in fig. 70, in which is represented the age incidence of cancer. A first glance at the diagram seems to show that it is related to the period of sexual vigour; but more careful examination shows that the cancer curve attains its maximum about the menopause or shortly after it, and that it does not drop down suddenly after the menopause. The influence of lowered vitality is brought out by the fact that it is more frequent amongst Dispensary patients than amongst the well-to-do. Privation and hardship seem to predispose to it. Another predisposing cause is multiparity. It occurs in women with large families and tends to develop in that part of the uterus on which labour leaves its mark. It is a torn cervix that is the seat of election, especially one where laceration has been followed by the changes of chronic inflammation. It is possible that here, as in the case of the lip, the junction of two different epithelial surfaces has to do with its development. It may occur early in life and

FIG. 70.—TABLE AND DIAGRAM SHOWING FREQUENCY OF CARCINOMA ACCORDING TO AGE OF PATIENT.





it is important to note that, as in cancer elsewhere, the younger the patient the more rapid the course of the disease.

*Symptoms.*—There are two important and distinctive symptoms associated with cancer of the cervix, irregular vaginal hæmorrhage and a fætid discharge, and these two symptoms occurring in a woman near the menopause should at once suggest the possibility of this condition. At a later stage, pain forms a third symptom.

As regards *hæmorrhage* it is most unfortunate for woman that the sign of the advance of her most dangerous enemy is covered by a normal function. Loss of blood, which from any other part of the body is at once the cause of alarm and leads to her seeking advice, is discounted in the case of the uterus. She has got accustomed to the sight of blood from that organ, so accustomed that nothing is more natural and therefore less likely to arouse suspicion than uterine hæmorrhage. After the change of life the appearance of hæmorrhage may lead her to seek advice at once, but even then it may be regarded simply as a recurrence of the monthly period. She thus delays seeking advice until long after the initial stages, and it is then found that the disease is beyond radical operative treatment.

The hæmorrhage is an irregular hæmorrhage, occurring between the menstrual periods, or appearing some months or years after the menopause in older women. The bleeding occurs from the ulcerated surface and is at first only slight in amount. As the ulceration extends, the bleeding becomes more profuse and more continuous; occasionally there may be severe floodings if a vessel of some size is opened into. The amount of blood lost may be so great as to lead to extreme anæmia, but it is seldom that death occurs directly from it.

The *discharge* is at first slight in amount and white in colour. As ulceration progresses it becomes more abundant and of a brownish colour, due to its admixture with blood. When the surface of the ulcer sloughs and is invaded by saprophytic organisms, it acquires a characteristic *fætid odour*.

*Pain* comes on at a later stage. It may not be limited to the pelvis but radiates from it through to the back and down the thighs. It comes on without any evident cause, being independent of the patient's movements or exertion. Sometimes the patient describes it as being worst at night, probably because there is less then to distract her attention. In all these respects it differs from pain due to chronic inflammation. Pain is so marked in the advanced stages of cancer that, along with the incurability of the disease, it is the great dread of the patient.

*Physical Signs.*—These differ according as the disease is in its earlier or more advanced stages.

We shall describe first of all the physical signs in the *advanced stage*, as they are absolutely characteristic and unmistakable. With the finger, a

large excavating ulcer can be felt extending over the vaginal roof, and in this the cervix may be indistinguishable. The ulceration has destroyed the cervix, the edges are hard and the surface irregular. When the finger-nail is applied to it the tissue is found to be friable, so that pieces of tissue can be readily broken off. On bimanual examination, thickening can be felt through the vaginal roof, indicating the involvement of the cellular tissue round the uterus. The body of the uterus may be normal in size or slightly enlarged, and it is fixed and immobile, owing to the infiltration round it. If the bladder or rectum is involved, fistulae may be present. On withdrawing the finger, it is blood-stained and has the characteristic penetrating odour.

In the *earlier stages* the physical signs are not so definite. If the case be seen before ulceration has occurred, all that is felt may be a slight thickening and hardness on one of the lips of the cervix, and it may be difficult to say whether the case is one of cancer or of chronic cervical catarrh with Nabothian follicles. In cervical catarrh, the whole cervix is affected; in cancer, only one part. Further, the surface is friable and there is hæmorrhage on examining it with the finger. As, however, the early diagnosis is most important, in all such cases a small piece of tissue should be cut from the suspected area and submitted to microscopic examination. When ulceration has occurred, the diagnosis ought to be easily made. The hardness of the edges, the friability of the surface, the readiness with which bleeding occurs after examination, taken in conjunction with the foetid discharge, usually put the diagnosis beyond question. To confirm it, it may be necessary to remove a piece for microscopic examination.

When the disease begins within the cervical canal, the earlier stages are not so easily detected, but as the patients are usually multiparæ and the cervix is lacerated, the finger can reach the affected area and the peculiar character of the cancerous ulcer be recognised. Sometimes it is only after dilating the cervix with the finger or a dilator that the presence of the disease is detected.

Having established the diagnosis of cancer of the cervix, it is necessary to determine the extent of the disease and the amount of secondary involvement, because on these depends whether treatment is to be palliative or radical. The chief points against the hope of cure by radical operation are extensive involvement of the vaginal walls, infiltration of the base of the broad ligament and of the bladder, and extensive involvement of the pelvic glands. The first can be easily recognised. The second is indicated by thickening in the vaginal roof and fixation of the uterus. The third may sometimes be detected by rectal examination. In doubtful cases the abdomen may be opened, because it is only then that the operator determines the advisability of attempting complete removal; and in some cases what looked like a malignant infiltration is found to be only an inflammatory thickening.

## THE MUCOUS MEMBRANE OF THE BODY OF THE UTERUS.

## Normal Histology.

The structure of the mucous membrane of the uterus is adapted to the two great functions which it has to perform—menstruation and decidual formation. It differs from every other mucous membrane in the body; and to understand its pathological changes, a knowledge of its structure in the resting stage, during menstruation, and during pregnancy, is necessary.

In the *resting stage*, midway between two menstrual periods, the

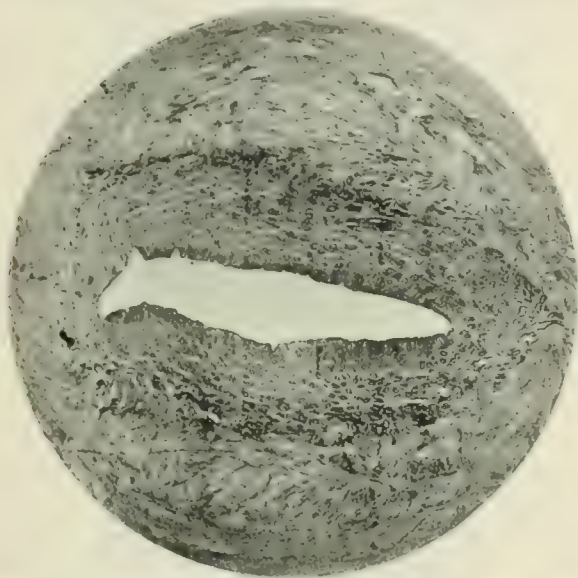


FIG. 71.—TRANSVERSE SECTION OF UTERINE WALL AND CAVITY.

Slightly enlarged to show the relation of the mucosa to the muscularis, the single layer of epithelium covering the former and the presence of glands.

mucous membrane is a thin layer about  $\frac{1}{3}$ th of an inch in thickness. To the naked eye it is of a pinkish colour and smooth on the surface. With a lens the minute orifices of the uterine glands can be detected. At the internal os there is a sharp transition from this smooth pink surface to the ridged and paler surface of the cervical mucous membrane.

When examined microscopically, a transverse section shows that the mucous membrane is set directly upon the subjacent muscle (fig. 71). It consists of a stroma of connective tissue covered with a columnar epithelium and contains glands. The stroma is the characteristic

part of the mucous membrane. It is composed of a connective tissue of an 'embryonic' type, by which is meant that it is almost entirely cellular. The cells are fairly large, and are irregular in shape, with branching protoplasmic processes which join with those of adjacent cells to

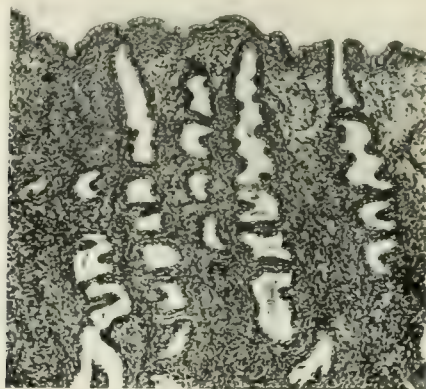


FIG. 72.—MUCOUS MEMBRANE OF UTERUS—SURFACE LAYER.

The stroma is highly cellular and contains capillary vessels. The surface is covered with a single layer of columnar epithelium which is ciliated. The cells are not so tall as those of the cervical mucous membrane and the nucleus is situated in the middle, not at the base of the cell. The epithelium dips down at intervals in the form of simple tubes, the uterine glands. These glands do not run vertically and so are seen to be cut in different directions.

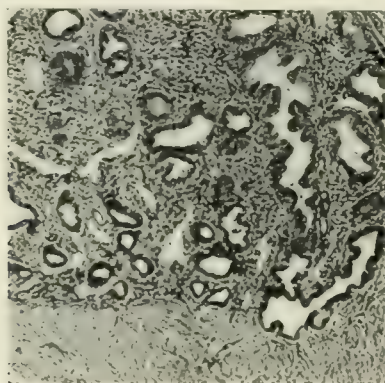


FIG. 73. —MUCOUS MEMBRANE OF UTERUS—DEEP LAYER.

The mucous membrane is set directly upon the muscular layer. Some of the uterine glands penetrate into the muscular layer. The stroma is more fibrous than in the superficial portions and the blood-vessels have thicker walls.



form the framework of the stroma (fig. 74). In addition to these there are ordinary spindle-cells, which are more abundant in the deeper part of the mucosa and give to this part a denser structure. The blood-vessels are capillaries only, their walls consisting of a single layer of endothelium somewhat poorly supported by the surrounding stroma cells (fig. 75). Towards the muscular layer the vessels have a thin fibrous coat. Lymphatic vessels are also present, and nerve terminals have been demonstrated. The loose nature of the stroma, the thinness of the walls of the capillaries, and the absence of fibrous connective tissue allow of the menstrual changes occurring, as will be described later. These changes could not occur in a connective tissue of the ordinary type. During pregnancy

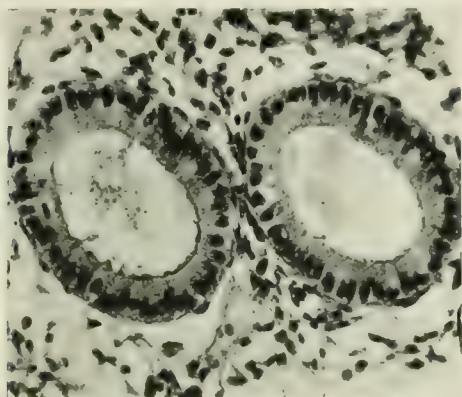


FIG. 74. MUCOUS MEMBRANE OF UTERUS; HIGH-POWER VIEW OF STROMA AND GLANDS.

In the stroma note the absence of connective-tissue fibres, the framework being composed of the branching processes of the stroma cells. These cells are large, polygonal in shape, and connected with each other by the protoplasmic processes. Two glands are seen cut transversely. Their outline is circular and regular, the lining is a single layer of columnar epithelium and there is a basement membrane. Contrast with cervical gland, fig. 44.

the cells of the stroma proliferate and enlarge to form decidual cells, and in this way the decidua of pregnancy is produced.

The covering of the mucous membrane consists of a single layer of columnar epithelial cells (fig. 72). Each cell has a centrally placed nucleus and is ciliated. At intervals this epithelial lining is broken by the openings of the uterine glands. These run somewhat obliquely downwards from the surface towards the deeper parts of the mucous membrane, and some of them end in the superficial parts of the muscular wall (fig. 73). They are of the simple tubular variety, when cut in transverse section have a circular outline, and are lined with a single layer of columnar epithelium (fig. 74). This epithelium is set on a

definite basement membrane; the cells have a centrally placed nucleus and are ciliated towards the free surface of the mucosa. They produce the watery alkaline secretion of the uterine mucous membrane.

**Menstrual Changes in the Mucous Membrane.**—It is only of late years, as the result of the examination of uterine scrapings and of uteri removed during menstruation, that we have learned the nature of the changes which occur at this time. For several days before the onset of menstruation the mucous membrane of the body is becoming more vascular. The capillary vessels dilate and a transudation of serum takes place through their walls, resulting in an œdema of the stroma. The stroma cells proliferate and enlarge (fig. 75). The uterine glands become tortuous and the epithelium proliferates, so that an appearance like that described as glandular endometritis may be produced. These

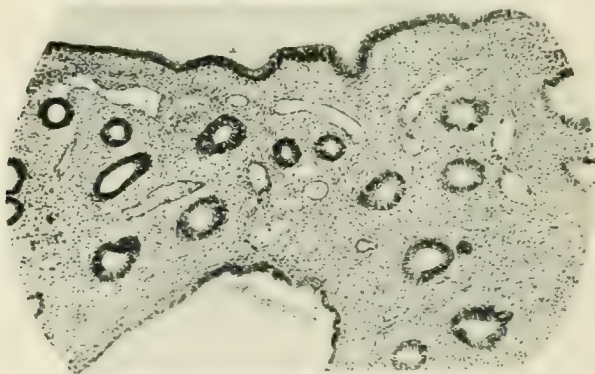


FIG. 75.—MUCOUS MEMBRANE OF UTERUS JUST BEFORE MENSTRUATION.

Note the looseness and œdema of the stroma and the dilatation of the vessels.

changes result in a considerable thickening and softening of the mucous membrane, affecting also the wall of the uterus. As the day of menstruation approaches, the capillaries become more dilated and a diapedesis first of white and then of red cells takes place through their walls. Finally the walls give way in places and the contained blood is extravasated into the stroma, which has been previously opened up and loosened by œdema. The extravasated blood finds its way to the surface and escapes into the cavity of the uterus through a series of minute breaches in the surface epithelium (figs. 76, 77). There is no casting-off of the surface epithelium as a whole as was at one time thought, except under pathological conditions such as membranous dysmenorrhœa, where the greater part of the mucosa may be detached and come away in the form of a more or less complete cast of the uterus. The extravasation of blood continues for several days, then the congestion lessens, the capillaries gradually return to their



normal size, their walls are repaired and the loss of blood ceases. The extravasated blood which remains breaks down and is absorbed. Some of the stroma cells, the older ones, degenerate and are also absorbed.

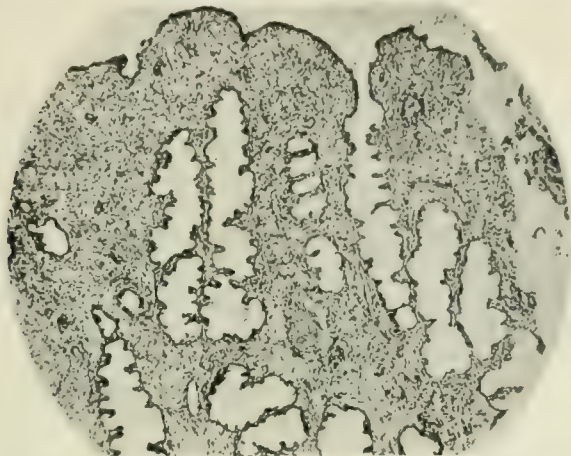


FIG. 76.—MUCOUS MEMBRANE OF UTERUS, FIRST DAY OF MENSTRUATION.

Note that the covering epithelium is intact; the stroma is loose and œdematous, the vessels dilated, the glands folded and dilated.

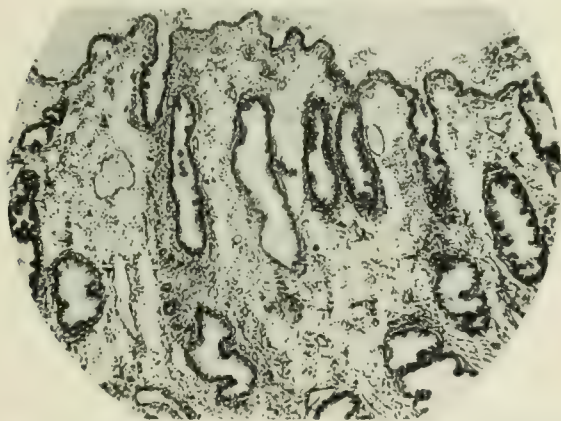


FIG. 77.—MUCOUS MEMBRANE OF UTERUS, SECOND DAY OF MENSTRUATION.

The epithelial covering is intact, the glands are dilated and the epithelium catarrhal.

The capillaries are widely dilated, the stroma is loose and œdematous and contains extravasated blood. Free blood is also seen on the surface.

The glands return to their normal condition and the surface epithelium again forms a continuous covering. In this way the individual elements of the mucous membrane are, as it were, renewed, and the function of

menstruation must be looked upon as a process for renewing the various histological elements of the mucous membrane. These elements, especially the stroma cells, are of embryonic type and as such have only a short life.

In interpreting the appearances presented under the microscope by uterine scrapings, it is always necessary to bear in mind those normal alterations which occur before and during menstruation; and before a definite opinion is given, the time in the menstrual cycle at which the curetting was done ought to be known. The changes described take place in the mucous membrane of the body of the uterus alone; the cervical mucosa has no share in them.

**Changes in the Mucous Membrane during Pregnancy.**—We do not mean to go fully into this subject, as it belongs more to obstetrics than to gynecology, but it is necessary to understand the nature and the mode of formation of the decidua of pregnancy. When an ovum becomes fertilised, the mucous membrane of the body of the uterus undergoes changes which at first are somewhat similar to those occurring before menstruation. It becomes more vascular, the stroma becomes œdematous, and the stroma cells proliferate and enlarge. In the case of pregnancy, however, this proliferation and enlargement of the stroma cells goes on to a much greater extent (fig. 78), until in the superficial parts of the mucosa they form a solid cellular mass and are known as decidual cells. These are large, polygonal in shape, and contain a rather small centrally placed nucleus. The cells fit closely in to each other, so that on section they form a mosaic (fig. 79). They compress and obliterate the upper part of the glands. In the deeper part of the mucosa, the more fibrous part, decidual cells are not so abundant. In this region the vessels become dilated, and as the result of the increased vascularity the deeper parts of the glands undergo hypertrophy and become dilated until only thin bridges of tissue intervene between them. The mucous membrane as the result of these changes becomes greatly thickened, measuring sometimes as much as a quarter of an inch, and these two areas can always be distinguished,—the superficial or compact layer, the deep or spongy layer. When the decidua separates it does so through the spongy layer, and the mucous membrane is re-formed from the remains of this layer which are left attached to the subjacent muscle. Such is the structure of the decidua in a case of extra-uterine gestation, or in the region where the ovum is not embedded.

At the site of the ovum, the epithelial elements of the chorion can be seen penetrating into the decidua. The chorionic villi are covered with epithelium of two types, a single layer of cells known as Langhans' layer, and outside that a multi-nucleated plasmodium, the syncytium. The cores of the villi are composed of embryonic connective tissue. It is important to be able to recognise these various elements, otherwise

mistakes will be made. A uterine scraping showing decidual cells may be diagnosed as cancer, a mistake easily made owing to the similarity in appearance between the decidual cells and a squamous epithelioma. In cases of hæmorrhage following incomplete abortion it is common to find degenerated remains of villi, and these, until they are known, are rather puzzling to the pathologist. Again, the diagnosis of chorionepithelioma

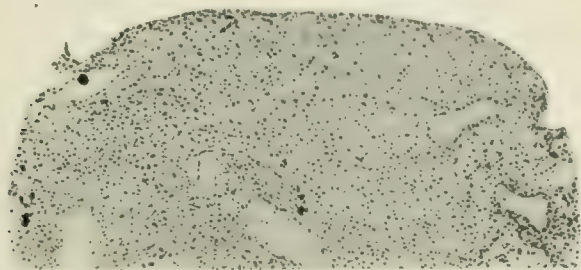


FIG. 78.—DECIDUA (L.P.).

The decidual cells appear as minute points. The gland spaces are pushed aside.

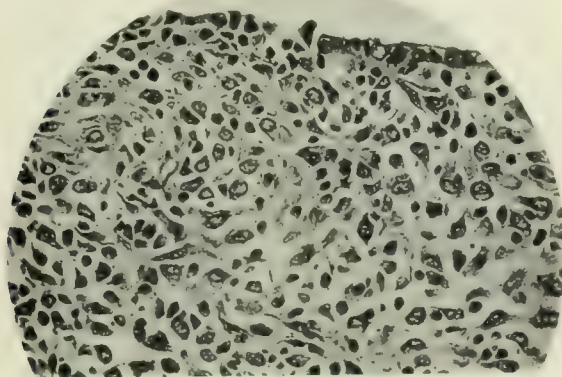


FIG. 79.—DECIDUAL CELLS (H.P.).

is made by the recognition of the two types of chorionic cells—Langhans' cells and the syncytium.

**Changes in the Mucous Membrane after the Menopause.**—As the menopause approaches, the uterus, together with the other pelvic organs, begins to atrophy. In the mucous membrane this takes the form, first, of a fibrous thickening of the coats of the vessels, which results in a diminished blood-supply. From the vessels this fibrotic change extends throughout the stroma, the cellular character of which is thus lost. The

glands atrophy and disappear, and finally, some years after the menopause, the mucous membrane is represented by a thin layer of connective tissue containing no glands and covered with low cubical epithelium. In time the latter may also disappear and adhesion of apposed raw surfaces lead to obliteration of the canal.

#### **PATHOLOGICAL CONDITIONS OF THE ENDOMETRIUM.**

Under this heading a variety of conditions are included. Much confusion has arisen over their nomenclature owing to the retention of the older clinical terms, some of which include a number of different pathological lesions. This is specially so with the condition known as chronic endometritis. This is not really an inflammation of the endometrium, as the name suggests, but includes such conditions as glandular hyperplasia, hyperæmia of the stroma, fibrosis of the stroma, and thickening of the vessels.

We shall consider the subject under the following heads:—

Acute Inflammation,  
Glandular Hyperplasia and Hyperæmia,  
Fibrosis and Thickening of Vessel Walls,  
Retention of Products of Conception,  
Tubercle of the Endometrium,  
Carcinoma of the Endometrium, :  
Chorionepithelioma.

#### **ACUTE INFLAMMATION (ACUTE ENDOMETRITIS).**

As in inflammation elsewhere, that occurring in the uterus is due to the invasion of pathogenic organisms. Under normal circumstances the endometrium is germ-free, their entrance from below being prevented by the nature of the vaginal secretion. This secretion has an acid reaction and can quickly kill off the ordinary pathogenic organisms should they gain access to the vaginal canal. After childbirth or after abortion, however, this natural barrier is to a certain extent overcome by the dilution of this secretion by the alkaline discharges from the uterus, so that organisms can gain access to it from below. Further, at those times organisms may be directly introduced into the interior of the uterus by the hand or instruments of the obstetrician. We therefore find that acute endometritis is most often a sequela of childbirth or abortion and is one of the forms of puerperal sepsis. In such circumstances the infecting organism is usually the streptococcus or staphylococcus, but the pneumococcus, gonococcus and bacillus coli have also been found. Apart from the puerperal condition, an acute gonococcal endometritis may occur following on a gonococcal cervicitis or vaginitis. The pathology of this condition does not differ from that observed in similar inflammations else-



where. There is a marked hyperæmia of the connective tissue; the affected area is extensively invaded with leucocytes, and there may be pus formation. If saprophytic organisms are present, large areas of superficial necrosis are produced. The inflammation may remain localised, or there may be a spread by lymphatics to the cellular tissue of the pelvis or by the veins, resulting in a septic phlebitis. The organisms may gain access to the blood-stream, setting up a generalised septicæmia.

The symptoms and signs present in this condition are those met with in the various forms of puerperal sepsis and do not require to be detailed here.

#### GLANDULAR HYPERPLASIA

(so-called *Chronic Glandular Endometritis*). This is a condition in which the uterine glands become increased in number, dilated, or tortuous; while the epithelium lining them is in a state of increased activity. While the glands present various appearances in different cases,

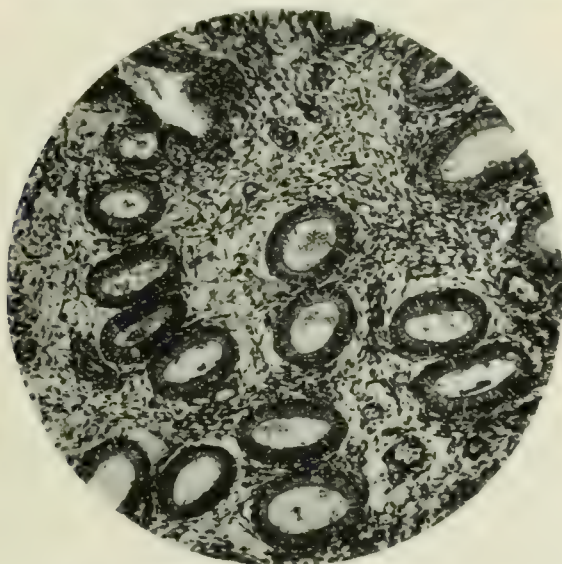


FIG. 80.—GLANDULAR ENDOMETRITIS.

Glands in cross section. Note the increase in the number and in the size of the glands, which, however, are quite regular in outline. The basement membrane is intact, the lining cells in a single layer.

they have always this in common, that they are lined only by a single layer of epithelium set on a definite basement membrane. In some cases the glands retain their normal tubular shape, and are simply increased in number; in addition to this, there may be considerable dilatation of the lumina of the glands (fig. 80). In others the glands become

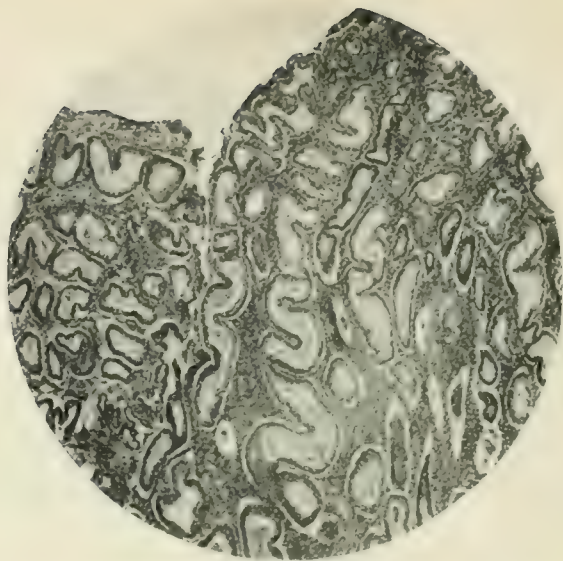


FIG. 81.—GLANDULAR ENDOMETRITIS.

Section of tissue removed by curette from a case of Glandular Endometritis. Note that the glands are increased in number, and many of them are tortuous and dilated.

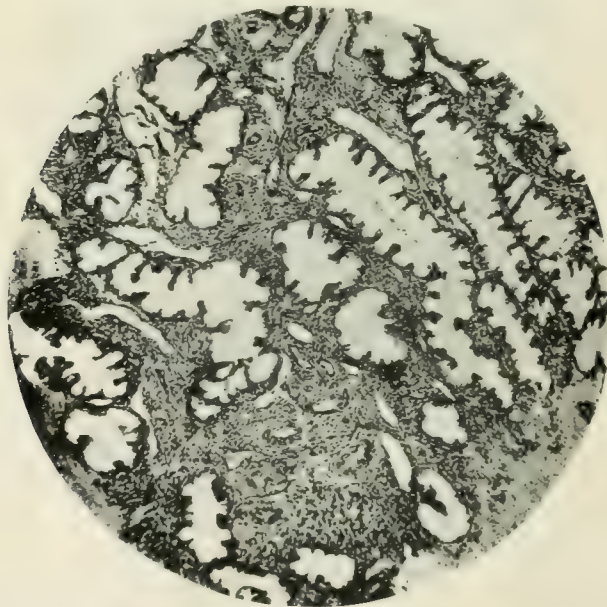


FIG. 82.—GLANDULAR ENDOMETRITIS.

Tissue removed by the curette, showing the increase in the number and in the size of the uterine glands and the folding-in of the epithelium towards the lumina, so-called hyperplastic glandular endometritis. The epithelium is always in a single layer. The vessel walls are thickened.



tortuous, presenting a corkscrew appearance on vertical section (fig. 81). Others, again, have in-foldings of the epithelium into the gland lumina, each in-folded part having a delicate stroma of connective tissue in its interior (fig. 82). This in-folding occurs as the result of the active proliferation of the epithelium and its inability to find accommodation for itself in the smooth lining of the glands. This form is sometimes called 'hyperplastic glandular endometritis'. In all of those forms described, the cells lining the glands may be in a more or less catarrhal condition.

In addition to those glandular changes, there is usually an increased vascularity (fig. 83), the capillary vessels being dilated, and the vessel

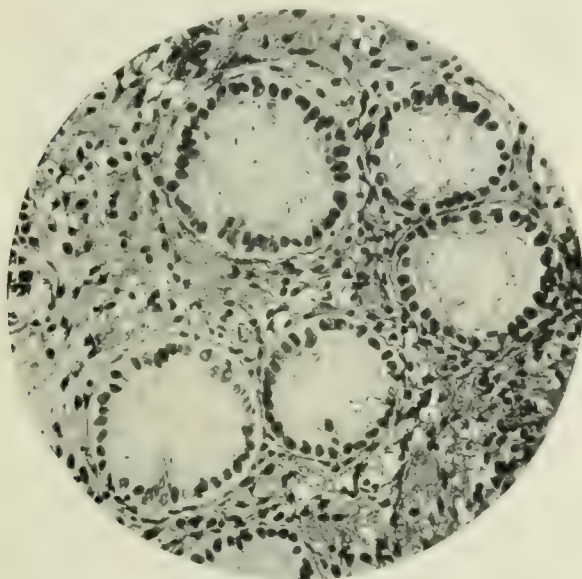


FIG. 83.—HEMORRHAGIC ENDOMETRITIS.

Note glandular increase and blood extravasation in stroma.

walls may be somewhat thickened as in fibrosis uteri. These changes result in an increased thickness of the mucous membrane, and to the naked eye it looks more vascular and spongy. In some cases the thickening is so great as to take the form of velvety projections very like those present in a carcinoma of the endometrium (fig. 84).

From the description given, it will be seen that this process is more of the nature of new growth than inflammation. It is really a simple adenoma. Sometimes the process remains localised to one part of the mucous membrane, which thus becomes considerably thickened. If the hyperplasia continues, the mass comes to project into the interior of the uterus. This stimulates expulsive efforts on the part of the uterus,

with the result that the projection becomes polypoidal and thus is produced the mucous polypus of the uterus. It is also therefore a simple adenoma.

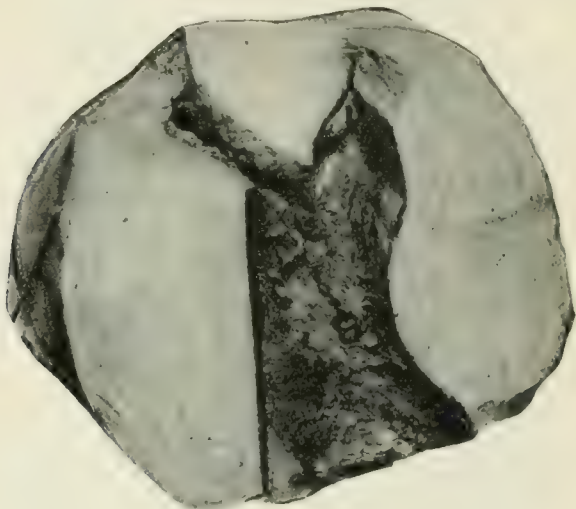


FIG. 84.—UTERUS WITH 'VILLOUS ENDOMETRITIS'.

The uterus has been laid open from the front, and the shaggy villous character of the mucous membrane is seen. The patient was curetted, but the hæmorrhage continued, so the uterus had to be removed. Microscopic examination showed it to be a simple adenoma.

**Clinical Phenomena.**—The causes leading to the above-mentioned conditions are various. Most frequently there is a history of preceding pregnancy or abortion. It is also met with, however, in nulliparous women without apparent cause. In retroversion, in retroflexion and in prolapse of the uterus, it is common, and it may also result from pelvic congestion caused by some pathological condition of the other pelvic organs or by some circulatory derangement.

The *symptoms* commonly complained of are menorrhagia, dysmenorrhœa, leucorrhœa. There may be a history of sterility or repeated abortions; there is pain in the back, irritability of the bladder, very often dyspepsia and constipation, and frequently anæmia. All those symptoms are not present in every case, and the same train of symptoms is met with in other diseases of the uterus. To the group French writers have given the name of the Uterine Syndrome.

A consideration of the pathology explains those symptoms. The menorrhagia, which may take the form of too prolonged or too frequent menstruation, is due to the increased vascularity and the thickening of the endometrium, which may also explain the dysmenorrhœa. The leucorrhœa results from the great increase in the number of the uterine glands.

The patient is sterile, because the ovum cannot engraft itself on the abnormal endometrium, or if it does become engrafted is quickly thrown off, because the decidua is unhealthy. The pain in the back is situated usually low down over the sacral region, and is a referred pain from the uterus. Frequency of micturition is due to reflex irritation, in some cases to cystitis. The constipation, dyspepsia, and anaemia complete the picture of the constantly ailing chronic invalid so frequently produced by this condition.

On *physical examination* the cervix may or may not be catarrhal; very often it is. The uterus lying to the front or back is enlarged, somewhat soft, and tender on movement. If the sound be introduced, it passes the internal os easily and goes in for more than  $2\frac{1}{2}$  in., usually about 3 or  $3\frac{1}{2}$ . With the point, irregularities may be felt on the surface of the mucosa. There may be slight hæmorrhage on withdrawing it. The diagnosis can only be completed, especially the differential diagnosis from cancer of the endometrium, by dilating the cervix and curetting the interior. Examination of the scrapings will show one or other of the conditions described.

#### FIBROSIS UTERI—CHRONIC METRITIS.

In describing the normal endometrium we pointed out that at the time of the menopause a change occurs in its structure. The capillary vessels

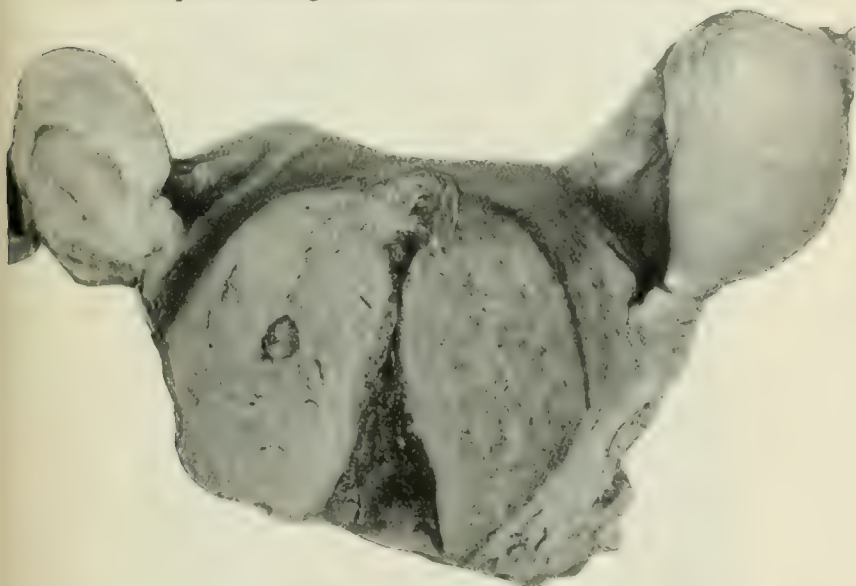


FIG. 85.—FIBROSIS UTERI.

Uterus removed by supra-vaginal hysterectomy on account of severe hæmorrhage unaffected by curetting. Note the thickness of the uterine wall and the way in which the vessels stand out from the cut surface in the left half of the section.

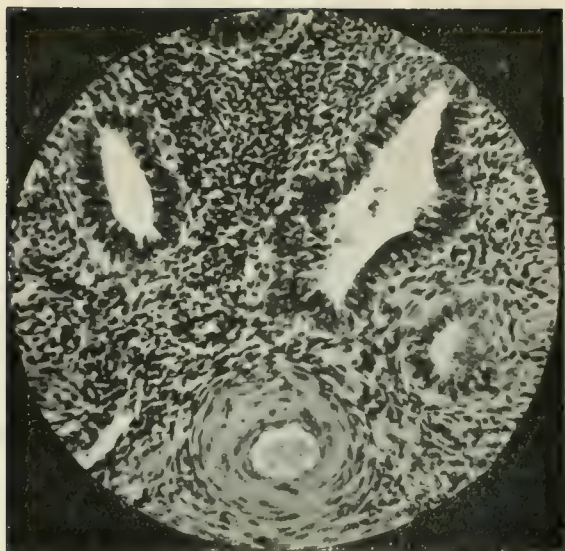


FIG. 86.—SECTION OF THE MUCOUS MEMBRANE FROM A CASE OF FIBROSIS UTERI, WITH PROFUSE HEMORRHAGE.

Note the marked thickening of the wall of the capillary in the lower part of the section.

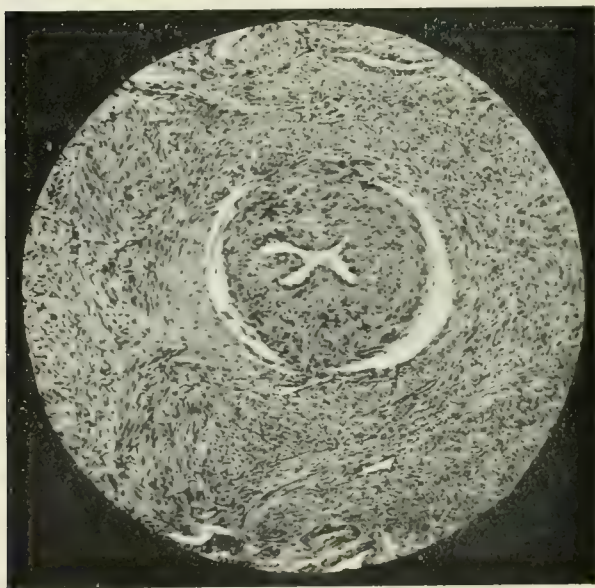


FIG. 87.—VESSEL OF MIDDLE THIRD OF MUSCULAR WALL, FROM SAME CASE AS FIG. 86,

showing thickening of tunica media and irregular thickening of the intima.



become surrounded by fibrous tissue and the stroma loses its cellular character and becomes more fibrous. Similar changes may, under pathological conditions, occur before the onset of the menopause and when they do so they give rise to well marked symptoms. To this condition the name **Fibrosis Uteri** has been applied. This term includes changes in the endometrium which have been described as **interstitial endometritis** and in the wall of the uterus as **chronic metritis**.

The pathology has only of late years been recognised from the examination of uterine scrapings and of uteri removed by hysterectomy (fig. 85). When the scrapings are examined, it is found, as a rule, that

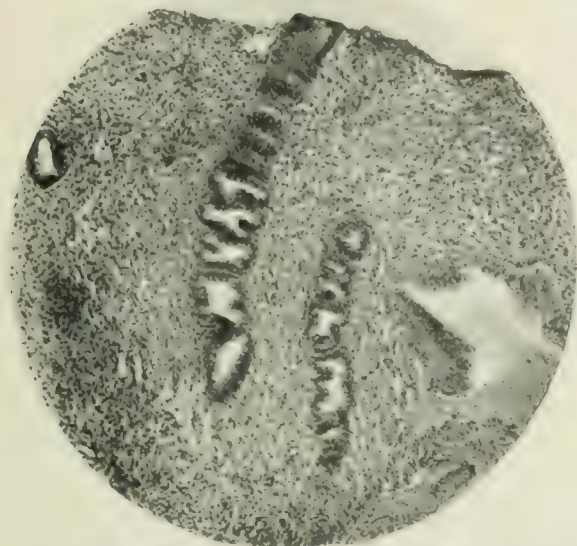


FIG. 88.—SECTION OF MUCOSA FROM A CASE OF INTERSTITIAL  
ENDOMETRITIS OR FIBROSIS UTERI.

Note that the glands are few in number and the stroma denser than normal.

only small pieces are obtainable. Under the microscope they show a stroma denser and more fibrous than usual. The vessel walls, instead of consisting of a simple lining of endothelium, have round them fibrous tissue, sometimes arranged in many concentric layers as in fig. 86. These vessel changes are always most pronounced in the deeper parts of the mucous membrane. The condition of the glands varies. In some cases there is considerable hyperplasia, whilst in others the glands are less numerous and are widely separated from each other (fig. 88). In cases where the uterus has been removed, histological examination of the uterine wall shows a similar sclerotic change in the larger vessels (fig. 87), and



sections stained by Van Gieson's method show a diminution in the muscle fibre and an increase in the fibrous tissue. The uterus is larger, harder and heavier than normal, and usually lies in a position of exaggerated anteversion.

**Clinical Phenomena—*Etiology.***—The pathological conditions described are met with only in the uteri of parous women, or in those of nulliparæ who have had some previous uterine inflammation. The condition is due to a preceding inflammation, staphylococcal, streptococcal, or gonococcal, and this usually arises in connection with childbirth or abortion. Sclerosis of the vessels and the fibrous over-growth are the direct sequelæ of the previous acute inflammation. As a rule there is no arterial sclerosis in the other vessels of the patient.

***Symptoms.***—There is one constant and striking symptom, namely, hæmorrhage from the uterus, taking the form of menorrhagia. Menstruation comes more frequently than normal and lasts for a longer time, continuing in some cases for a fortnight, so that the patient has only a few days' interval till the next period begins. The quantity lost is excessive and the blood is frequently clotted. This excessive hæmorrhage is due to the loss of contractility in the uterus owing to the replacement of muscle fibres, to the inability of the thickened vessels to control the supply of blood to the endometrium, and to the failure of the opened-up vessels to again close. In addition to the hæmorrhage there is often dysmenorrhœa. Leucorrhœa is usually not a prominent symptom because of the atrophy of the glands. Pain in the back is frequent. Irritability of the bladder is often present owing to the pressure of the heavy anteverted uterus. The patients as a rule are sterile. We have described, however, one case where a patient with such a condition of the endometrium had frequent abortions, and we believe that these abortions were brought about by the malnutrition of the decidua resulting from the sclerotic condition of the vessels.

***Physical Signs.***—On vaginal examination the cervix is usually felt high up and directed downwards and backwards. It is firmer than usual and may or may not be the seat of a catarrh. Through the anterior fornix the body of the uterus can be felt distinctly. On bimanual examination the uterus is found to be anteverted, enlarged, hard, and usually tender on movement. The retroverted or retroflexed uterus may also be the seat of a fibrosis. The fibrotic uterus differs from one affected with glandular hyperplasia or chronic endometritis, chiefly in its hardness when grasped between the hands; so that an exact diagnosis can only be made by curettage. When this is done it is found that the cervix is not easily dilated, and that the curette grates at once on the fibrous tissue. As a rule only small fragments of endometrium can be removed. Microscopic examination of these establishes the diagnosis.

## RETENTION OF PRODUCTS OF CONCEPTION.

When an ovum is expelled, either at full time or in the earlier months, there ought to come away with it the whole of the decidua lining the interior of the uterus, separation taking place through the spongy layer. In some cases, however, this complete expulsion does not occur and fragments of decidua and chorion may be left behind. In many cases such fragments are expelled spontaneously at a later date, but in others they remain attached to the uterine wall for considerable periods. Such retained products interfere with the involution of the uterus and lead to a persistence of the hæmorrhage which accompanied the labour or

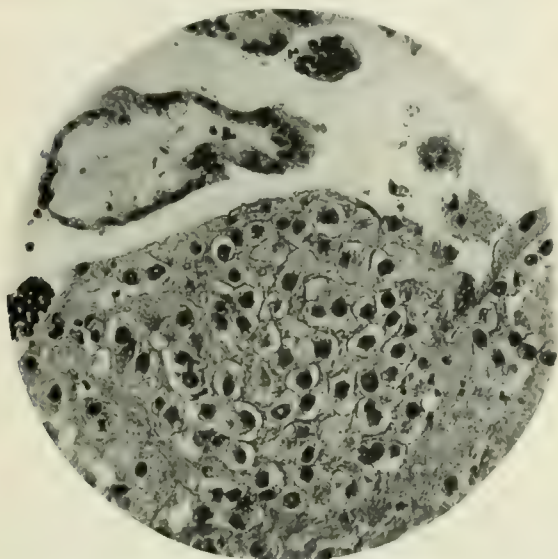


FIG. 89.—SCRAPING FROM CASE OF INCOMPLETE ABORTION.

In the lower part of the section is a mass of degenerated decidual cells, in the upper part a chorionic villus.

abortion. The retained decidua may remain active for some time but gradually undergoes a process of degeneration. The chorionic villi quickly die, their epithelial covering degenerates and disappears, and after a time all that remains of them is their connective-tissue cores, which also are degenerated. The appearances presented by the tissue removed by the curette from such cases vary therefore with the time which has elapsed between the abortion and the date of operation. Fig. 89 shows the tissue removed two weeks after an incomplete abortion. The decidual cells have begun to degenerate, the protoplasm is vacuolated, the nuclei shrunken. The chorionic villus still retains its epithelium, but it also has begun to degenerate. Fig. 90 is a section of tissue removed several

weeks after an incomplete abortion. The great mass of the tissue consists of blood-clot and in it are embedded the remains of the villi. Their epithelial coverings are gone, the vessels in the cores are obliterated, and the fibrous tissue is degenerated. They are sometimes known as 'ghost villi'. Such appearances are absolutely diagnostic of a previous pregnancy. Under certain conditions, the nature of which we do not at present know, the epithelium of such retained chorionic villi may take on active growth, giving rise to a tumour of a highly malignant nature,—the condition known as *Chorionepithelioma*. This will be discussed later.

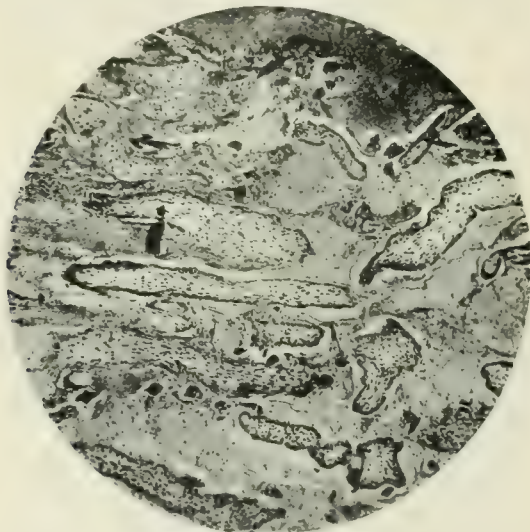


FIG. 90.—SCRAPING FROM CASE OF INCOMPLETE ABORTION.

The great mass of the tissue is made up of degenerated chorionic villi, the outline of which can easily be recognised; in some, the epithelial covering is still intact. They lie imbedded in blood-clot.

**Clinical Phenomena—Symptoms.**—The clinical feature of such cases is continued hæmorrhage for a considerable time after delivery or abortion. In some, hæmorrhage may cease after the usual ten days or a fortnight but recur and remain persistent after the patient gets up. In others the bleeding may not begin again until the first menstrual period, which becomes indefinitely prolonged. If organisms gain access to the uterine cavity the discharge may become fetid, and puerperal sepsis develop in one of its various forms.

**Physical Signs.**—On vaginal examination the cervix is as a rule patulous, sometimes admitting the forefinger. This at once suggests that there is something in the uterine cavity. Bimanually the uterus is found to be enlarged, somewhat soft, and more rounded than usual. The diagnosis is made from the preceding history of childbirth or abortion,

the persistence of the hæmorrhage, the patulous condition of the cervix, and the enlargement of the uterus, and is definitely established by curetting the interior and finding under the microscope the appearances shown in figs. 89 and 90.

#### TUBERCLE OF THE ENDOMETRIUM.

Tubercle is rarely primary in the endometrium. As a rule it is secondary to tubercle in the lungs, in the peritoneum or in the tubes, and

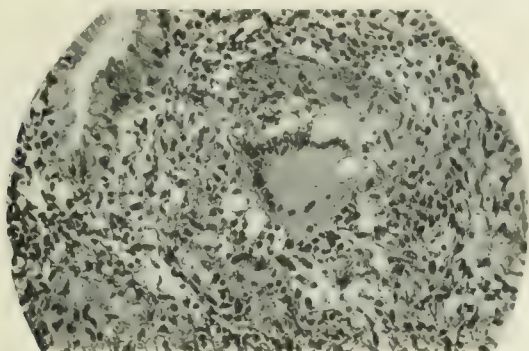


FIG. 91. TISSUE REMOVED BY CURETTE FROM A CASE OF TUBERCULOUS ENDOMETRITIS.



FIG. 92.—TUBERCLE OF ENDOMETRIUM.

Uterine wall from case of tuberculous pyosalpinx. Note muscular wall below, then uterine glands cut across, and tubercle nodule under free surface of mucosa.



is of secondary importance as compared with the primary focus. It usually takes the form of isolated tubercle nodules situated in the substance of the mucous membrane. The nodules present typical characters with epithelioid, round and giant cells. The condition can only be diagnosed by an examination of the uterine scrapings. Fig. 91 shows a scraping from the uterus of a patient who seven years previously had been operated on for tuberculous peritonitis. Fig. 92 is a section of the wall of the uterus which was removed along with double tuberculous tubes.

*Clinical Phenomena.*—As a rule the symptoms are masked by those of the general condition, but the presence of menorrhagia in a tuberculous subject ought to suggest the possibility of the endometrium being affected, because as a rule in tuberculous women menstruation is in abeyance. In determining the treatment, the nature and extent of the primary affection must be taken into account.

#### CARCINOMA OF THE ENDOMETRIUM.

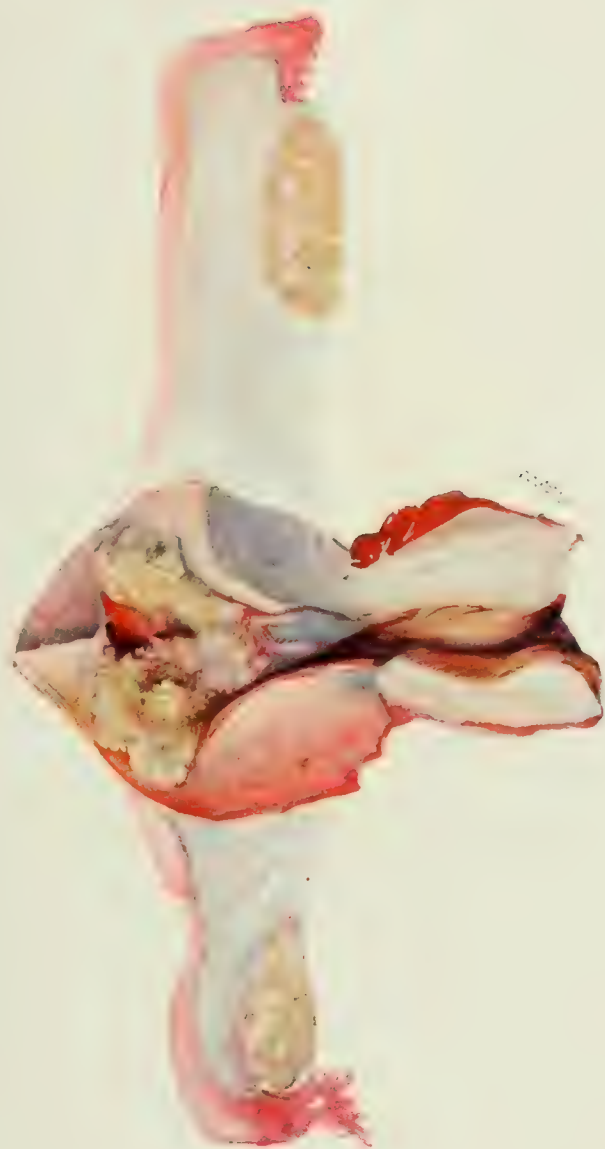
The endometrium is the usual site for the development of cancer in the body of the uterus. It develops in connection with either the surface columnar epithelium or the epithelium of the glands. It may remain localised to a small area or take on diffuse growth, spreading over the whole interior of the uterus (figs. 93, 94).

Plate III. shows the uterus removed from a patient who complained of some hæmorrhage after the menopause. Diagnosis was made from microscopic examination of the tissue removed by the curette, and pan-hysterectomy was performed.

When springing from the surface epithelium, it takes the form of a *columnar carcinoma*. The active proliferation of the epithelial cells and the subjacent connective tissue produces a fungating tumour, which projects into the interior of the uterus. Microscopically the growth is found to consist of solid masses of columnar cells which invade the stroma of the endometrium, and which later penetrate through the muscular wall and even through the peritoneal covering. When the growth arises in connection with the glands it is known as an *adeno-carcinoma*. The cells lining the glands proliferate so as to form several layers (fig. 95). They penetrate through the basement membrane and invade the stroma (fig. 96), sometimes forming solid plugs. In the advanced stages it is difficult to distinguish an adeno-carcinoma from a columnar carcinoma. The naked-eye appearances are similar in both cases.

Another form of cancer has been described under the name *malignant adenoma*. This differs from the adeno-carcinoma in that the cells lining the glands remain in a single layer. The glands, however, are greatly increased in number, irregular in formation, and penetrate into the muscular wall of the uterus. It is on this last feature that the diagnosis of its malignancy depends.





CARCINOMA OF THE ENDOMETRIUM



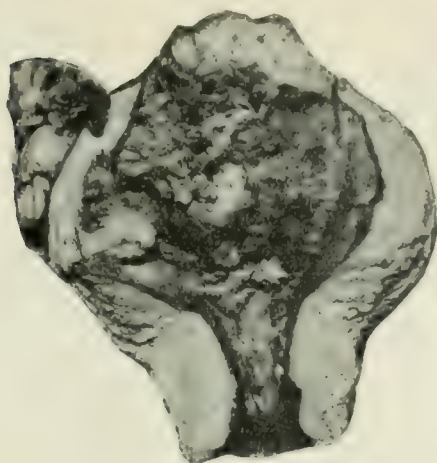


FIG. 93.—CANCER OF THE BODY OF THE UTERUS.

The uterine cavity has been laid open to show the diffuse growth on the anterior wall. The mucosa in the vicinity of the internal os is still healthy.

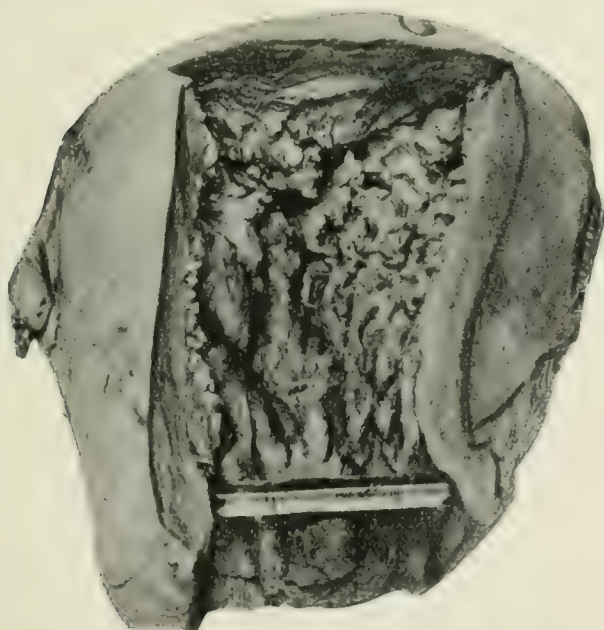


FIG. 94.—CANCER OF THE BODY OF THE UTERUS.

The cancer has invaded the whole extent of the uterine mucosa, forming large fungating masses.

These three types of cancer produce very similar changes in the uterus and run very much the same course. Cancer of the body of the uterus is not so frequent as cancer of the cervix, but we are now coming to

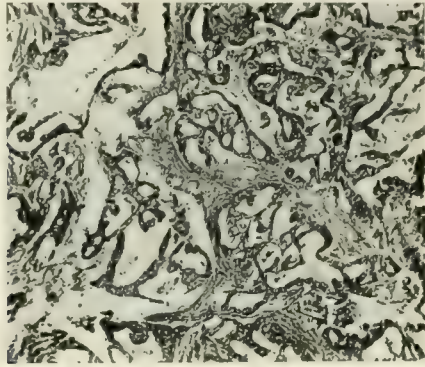


FIG. 95.—ADENO-CARCINOMA OF THE ENDOMETRIUM (L.P.).

This is a carcinoma originating in the uterine glands. Note their irregularity. The epithelium lining them is irregular and is in several layers. The nuclei of the cells are large and their situation is irregular. Contrast with glandular endometritis, figs. 80-83.

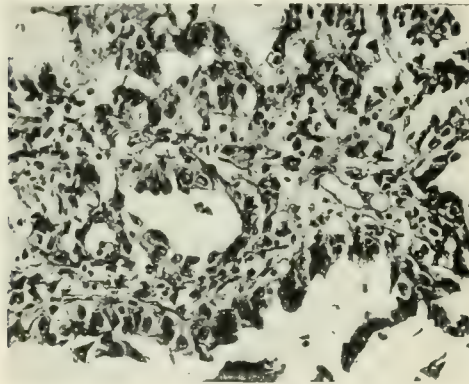


FIG. 96.—ADENO-CARCINOMA OF ENDOMETRIUM (H.P.).

Note character of epithelium and its proliferation into the stroma.

recognise that it occurs more frequently than was formerly supposed. Many of the cases were diagnosed as sarcoma. The course of the disease is slower than in cancer of the cervix, and extension takes place, firstly, into the substance of the uterine wall, and secondly, by a lymphatic

spread to the lumbar glands in front of the aorta which drain the lymph from the body of the uterus (fig. 68). Extension to the cervix or vagina is extremely rare. As a result of the growth in the interior, the uterus becomes enlarged, but it very seldom attains a size bigger than a two-months' pregnancy. If the patient be past the menopause, the uterus may be actually smaller than normal.

**Clinical Phenomena—Etiology.**—The disease usually arises at or after the time of the menopause. It may occur either in nulliparous or multiparous women, probably more frequently in the former. This is in direct contrast with cancer of the cervix.

**Symptoms.**—The first symptom as a rule is hæmorrhage. If the patient is still menstruating, this may at first take the form of menorrhagia. Later, however, when ulceration has occurred, the bleeding becomes irregular—metrorrhagia. If the patient be past the menopause there is a reappearance of hæmorrhagic vaginal discharge, but coming on at irregular intervals. Unfortunately this is regarded by the patient as simply a return of menstruation. The hæmorrhage is followed by the appearance of a leucorrhœal discharge, at first light in colour and small in amount but gradually becoming darker in colour, more abundant, and acquiring a fœtid odour. The fœtor is, however, never so pronounced as in cancer of the cervix. A third symptom very often present is pain. The pain may be similar to that in the late stages of cancer of the cervix, felt mostly in the back and shooting down the thighs. In some cases, especially those occurring after the menopause, the internal os may from time to time become occluded, with the result that blood and discharge are prevented from escaping, leading to the condition of pyometra. In the later stages the patient presents all the symptoms of a general cancerous cachexia.

**Physical Signs.**—When a patient at the age of the menopause presents the three symptoms of uterine hæmorrhage, fœtid leucorrhœal discharge, and pain, the possibility that she is suffering from cancer of the uterus is at once suggested. If the cancer is situated in the cervix, it is at once felt on vaginal examination; if in the body of the uterus, it is not so easily recognised. In the majority of cases all that can be said is that the uterus is enlarged, and a diagnosis cannot be made until the interior has been explored either by means of the finger or with the curette. In order to do this, it is usually necessary to give the patient an anæsthetic and to dilate the cervix with graduated or expanding dilators. If sufficient dilatation be obtained to admit the finger, the condition of the uterine mucosa can be felt and the diagnosis confirmed. In most cases, however, it is better simply to introduce the curette and bring away some fragments of tissue for microscopic examination. Figs. 95 and 96 show the appearances presented by such scrapings. It is important not to delay carrying out this exploration, because if the disease be recognised



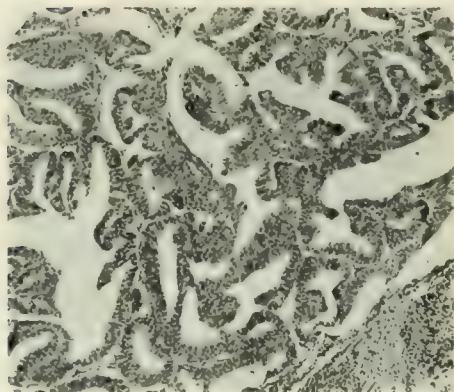


FIG. 97.—MALIGNANT ADENOMA OF ENDOMETRIUM.

The epithelial arrangement maintains its glandular character and there is little tendency to heaping up of epithelial masses. Malignancy is shown by the deep penetration into the muscular wall (fig. 98).

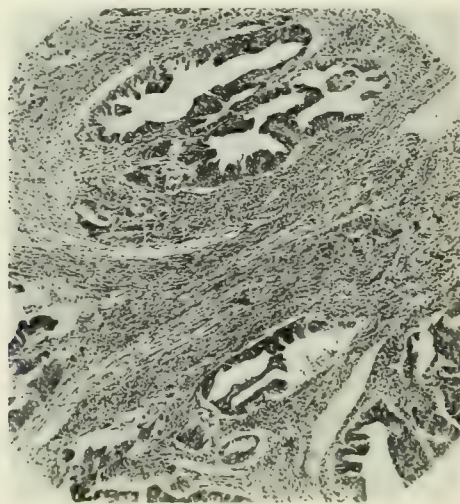


FIG. 98.—MALIGNANT ADENOMA OF ENDOMETRIUM.

Muscular wall from same case as fig. 97, showing the deep penetration of the glandular structure into the muscular wall.

early the prospect of a permanent cure after abdominal hysterectomy is fairly good, much better than in cancer of the cervix.

#### CHORIONEPITHELIOMA—DECIDUOMA MALIGNUM.

Chorionepithelioma is a malignant disease which arises in the uterus some time after pregnancy. The condition was first described by Sänger, who gave to it the name of *deciduoma malignum*, as he considered that the disease arose from the decidua and was of the nature of a sarcoma. Subsequent investigations have shown that the condition has its origin not in the decidua but in the epithelial coverings of the chorionic villi, that is to say, it arises from foetal tissue. The chorionic villus consists of a core of connective tissue containing blood-vessels, with an epithelial covering. This covering is composed of two layers,—a layer of epithelial cells first described by Langhans and known by his name, and outside that, plasmodial masses with scattered nuclei known as the syncytium. To these two layers the term *trophoblast* has been given. The function of the trophoblast is to eat into the decidua and so fix the ovum in position; and in addition it has the power of opening into the walls of the dilated blood-vessels and forming sinuses through which the nutrition of the ovum is carried on. In a normal pregnancy this penetration of the trophoblast does not go farther than the compact layer of the decidua; and when the ovum is expelled, either in the early months or at full time, the trophoblast is completely thrown off along with the decidua. When the ovum undergoes the changes described under the term 'hydatid mole', it is found that the trophoblast is in a state of excessive activity and that it penetrates more deeply into the uterine wall than normally, in some cases extending through the muscular wall to the peritoneal surface. When a hydatid mole is expelled, it is therefore not infrequent for chorionic villi and masses of trophoblast to be left behind. When this is so, as a rule the tissue left simply degenerates and is absorbed. Sometimes, however, the trophoblast retains its activity, continues to proliferate, and thus forms a localised tumour in the uterine wall. Such a tumour is known as a chorionepithelioma, as it is derived from the epithelial coverings of the chorion. The same thing may occur after an ordinary abortion or after a full-time labour. Why in some cases the trophoblast should acquire this excessive proliferating power, we do not know. It must be due to one of two factors, either excessive activity of the trophoblast or defective resisting power on the part of the decidua. We believe that one of the chief functions of the decidua is to limit and restrain the penetrative action of the foetal trophoblast. The internal secretion of the corpus luteum may play some part in the development of the trophoblast and it is common to find lutein cysts in the ovary in cases of hydatid mole.

Fig. 99 shows a characteristic nodule. To the naked eye it seems to be composed for the most part of blood-clot, and the free surface is usually in a breaking-down condition. When examined microscopically, the greater part of the tumour is found to be composed of blood-clot, especially towards the free surface. It is only in the deeper, actively growing portion that the typical structure is seen. In this area two types of histological elements are distinguished. There are numbers of large epithelial cells corresponding to the cells of Langhans' layer, and there are also nucleated plasmodial masses corresponding to the syncytium (fig. 101). These epithelial cells and syncytial masses are penetrating deeply into the muscular layer of the uterus, and at the point of penetration the muscle fibres are being broken up and absorbed (fig. 100). The walls of the blood-vessels are eaten into and destroyed, whilst the syncytium applies

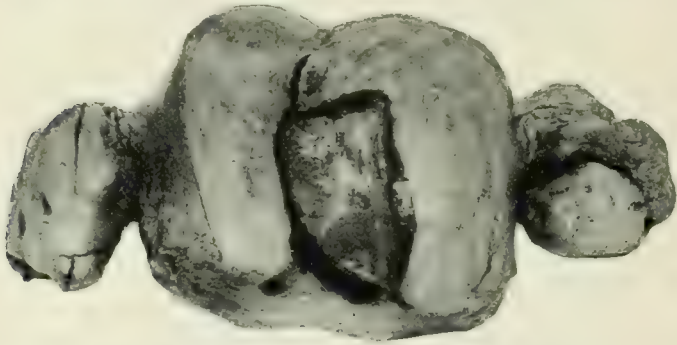


FIG. 99.—CHORIONEPITHELIOMA OF THE UTERUS.

The tumour is dark in colour owing to hæmorrhage. It is growing from the region of the fundus, and projects in polypoid fashion into the uterine cavity.

itself to the endothelium and, extending along the lumina of the vessels, may project into them in the form of plugs. In this way large extravasations of blood are produced. The growth rapidly extends into the uterine wall, while the more superficial areas undergo necrosis. The tumour has thus all the characters of a malignant growth. Owing to the peculiar action of the tumour cells on the walls of the blood-vessels, metastatic deposits occur early and diffusely. Masses of the trophoblast are carried off in the venous stream and continue to grow wherever they are deposited. The first organ to be affected is naturally the lung, and after that the vagina, vulva, and also more distant parts of the body. Chorionepithelioma is thus one of the most rapidly advancing malignant diseases known.

The secondary deposits have the same characters as the primary growth. There is the same tendency to extravasation of blood, and when this becomes excessive it may result in the destruction of the active cells. In this way spontaneous healing of secondary deposits may occur as was

first described, in the case of the lung, by Teacher. This healing of secondary deposits is of importance in connection with treatment, for it encourages us to make an attempt at the complete removal of the primary focus even in cases where physical examination shows that the lung is slightly involved.

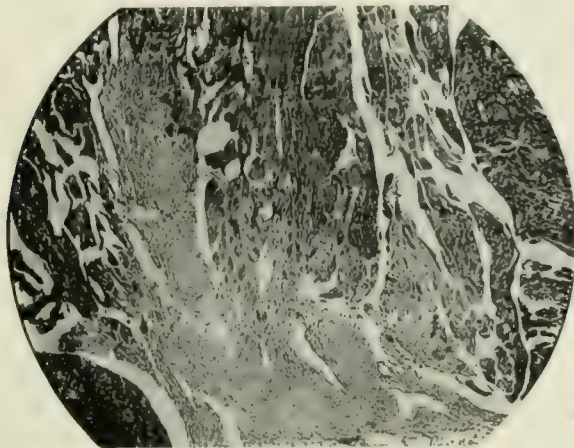


FIG. 100.—CHORIONEPITHELIOMA OF THE UTERUS (L.P.).

The tumour is composed of two types of cells, large masses of nucleated protoplasm, the syncytium and isolated epithelial cells, Langhans' cells. Note how the growth in the upper part of the section is eating into the muscular wall—the paler part below.

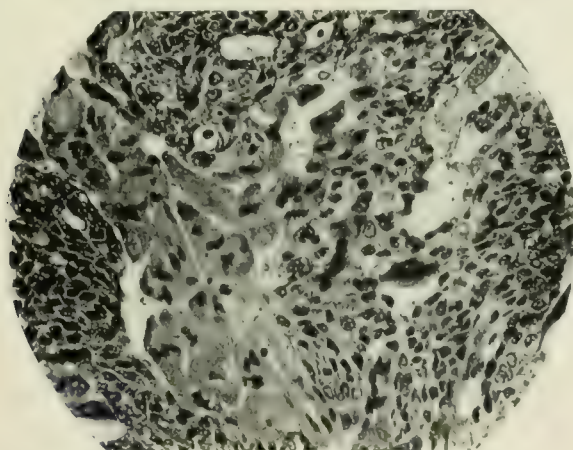


FIG. 101.—CHORIONEPITHELIOMA OF THE UTERUS.

High-power view to show structure of syncytium and Langhans' cells.



**Clinical Phenomena—Etiology.**—The condition follows pregnancy, and especially pregnancy terminating in hydatid mole. It manifests itself within a few weeks, but may be delayed for months. It was at one time thought that microscopic examination of the villi in hydatid mole would show whether chorionepithelioma was likely to develop or not, but more recent investigation has disproved this. The disease may also arise apart from pregnancy, and cases have been described in the male. In such the origin is to be ascribed to 'rests'.

**Symptoms.**—The only symptom present in the early stages is uterine hæmorrhage, which usually occurs suddenly, is profuse in amount, and recurs frequently. Such hæmorrhage occurring after the expulsion of a hydatid mole should always arouse suspicion, and an exploration of the interior of the uterus with the finger or curette should at once be made. After an ordinary abortion or full-time labour the likelihood of chorionepithelioma being present is not so great, but any persistence of hæmorrhage calls for careful curettage and examination of the scrapings. The extension of the disease is so rapid that local symptoms are very soon merged in those due to the involvement of distant organs. When the lungs are affected, the patient develops cough and hæmoptysis. The total duration of the disease may not exceed a few months, the patient dying of a general cachexia.

**Physical Signs.**—In the early stages these are insignificant. The tumour in the uterus is seldom a large one, and therefore little increase in the size of the uterus can be detected. Many cases have been described where the first physical sign of the condition was the appearance of secondary nodules in the vulva or vagina. This fact emphasises the importance of early diagnostic curettage. It must be done thoroughly, because if only the superficial parts of the growth are scraped away nothing but blood-clot is found. This happened in the case from which the sections shown in figs. 100 and 101 were obtained. It was only after a subsequent curettage in hospital that the typical cells were detected, and their recognition led to the removal of the uterus. This patient ultimately died with secondary deposits in the lungs. Had the condition been recognised on the first curettage, pan-hysterectomy might have averted the fatal termination.

### FIBROID TUMOURS OF THE UTERUS.

The uterine fibroid is a tumour composed partly of fibrous and partly of non-striated muscular tissue. For this reason it is sometimes called a *fibro-myoma*. The relative proportion of fibrous and muscular tissue varies, but usually the former is in excess. They may attain a large size, but in their growth they do not invade the wall of the uterus, merely expanding it. All such tumours arise in the muscular wall of the



uterus. Their exact mode of origin is still uncertain, but the most likely explanation is that they develop in connection with the coats of the blood-vessels of the uterine wall. Each tumour would thus be developed round different centres, and we find that in the fully developed tumour there is a whorled appearance on section. Fibroids are usually multiple.

Beginning in the middle muscular wall of the uterus, the tumour as it grows may continue to expand equally in all directions, causing a more or less uniform enlargement of the uterus. Such a fibroid is called *intramural* or *interstitial*. If the growth takes place more towards the peritoneal



FIG. 102.—INTERSTITIAL FIBROID TUMOUR OF THE UTERUS.

The uterus and tumour have been cut in vertical mesial section. Note the uterine cavity, and large tumour growing in the posterior wall. It has a distinct capsule all round, has a whorled appearance on its cut surface, and is light in colour compared with the uterine wall.

aspect of the uterus, it forms a localised projection, and is known as a *sub-peritoneal* fibroid. Such a tumour may acquire a narrow neck, and is then distinguished as a *pedunculated sub-peritoneal* fibroid. In other cases the tumour tends to grow towards the mucous membrane aspect of the uterus, causing a projection into the uterine cavity which is covered with mucous membrane—a *sub-mucous* fibroid. Projecting into the interior of the uterus, such a tumour sets up uterine contractions which expel the tumour downwards towards the external os. In this way the growth acquires a narrow neck, and is known as a *pedunculated sub-mucous*

*fibroid* or *fibrous polypus*. The neck may become so elongated as to permit of the extrusion of the tumour through the cervical canal into the vagina, and in some cases the neck may give way and the tumour be completely expelled.

After removal of the uterus it is easy to distinguish between these

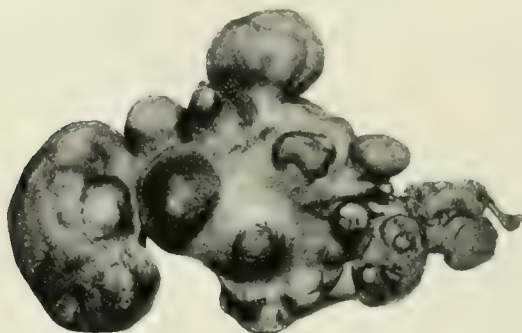


FIG. 103.—UTERUS WITH MULTIPLE SUB-PERITONEAL FIBROIDS. Some of the tumours are sessile, others are distinctly pedunculated.

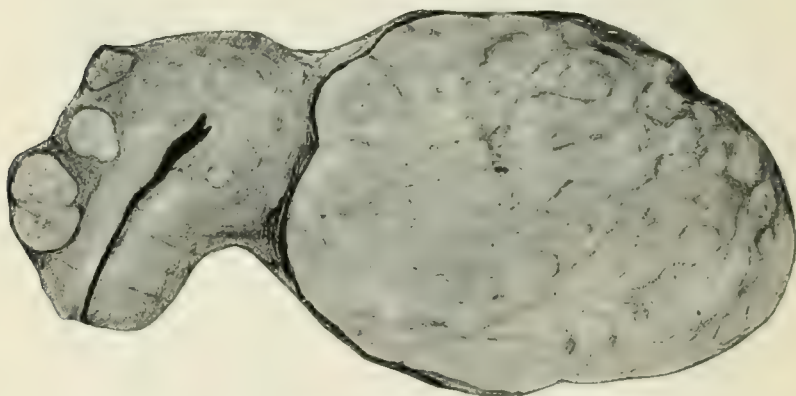


FIG. 104.—UTERUS WITH SUB-PERITONEAL FIBROID.

The uterus and tumour are cut in vertical mesial section. A number of small interstitial fibroids surround the cavity. A larger one forms a marked projection from the peritoneal aspect of the posterior wall.

three varieties of fibroid tumours. Fig. 102 shows a typical interstitial one. It is growing from the posterior wall of the uterus and is uniformly expanding it. The length of the uterine cavity and the total area of mucous membrane are increased. The tumour itself is hard in consistence, glistening white in appearance on section, and the fibres are arranged in a series of whorls round different centres. The whiteness of the

tumour is due to the absence of blood-vessels and contrasts with the pink uterine wall in which it is embedded. Surrounding the tumour is a loose connective-tissue capsule from which it can be easily shelled out. This capsule is very vascular.

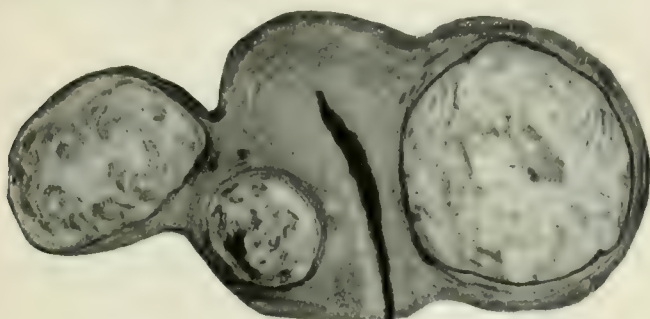


FIG. 105.—UTERUS WITH INTERSTITIAL AND SUB-PERITONEAL FIBROIDS.]

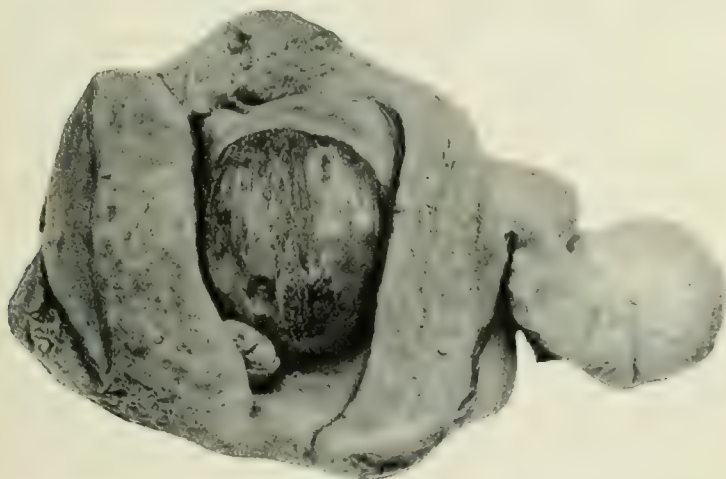


FIG. 106.—SUB-MUCOUS FIBROID TUMOUR OF THE UTERUS.

The uterus has been laid open from behind to show in the interior a sessile tumour growing from the anterior wall and projecting into the cavity. The surface of the tumour is dark in appearance, owing to hemorrhage. A piece has been cut out for microscopic examination. Below the larger tumour is a small mucous polypus.

Sub-peritoneal tumours are usually multiple. Fig. 103 shows a uterus studded all over with them; some are sessile, others pedunculated. On section they have the same naked-eye appearances as the interstitial tumours, except that there is only a very thin layer of muscle tissue separating the tumour from the peritoneum (figs. 104, 105).

The term *sub-mucous* is applied to a tumour lying below the mucosa (fig. 106); but sometimes it is in part interstitial (fig. 107). A sub-mucous tumour may set up uterine contractions which cause its expulsion. This leads to its pedunculation and the formation of a 'fibrous polypus'. Fig. 108 shows a tumour which has become pedunculated and projects through the cervical canal. In those sub-mucous tumours the capsule is situated directly under the mucous membrane, the latter being intact over the surface of the growth except in cases where the tumour has been extruded into the vagina, and the surface has become ulcerated or damaged.

In the same uterus all three varieties of tumour may be met with (fig. 109).

*Microscopic Structure.*—When sections stained with hæmatoxylin and eosin are examined under a low power, the tumour is seen to consist of bundles of fibres running more or less concentrically, and of spindle-shaped cells (fig. 110). When stained by Van Gieson's method the non-stripped muscle fibres stain yellow, the connective-tissue fibres pink, and the relative proportion of the two can be seen. Usually the pink connective-tissue fibres are in excess of the yellow muscle fibres. Blood-vessels are few in number and have well-formed walls. Lymphatics are represented by endothelium-lined spaces and channels between the fibres.

*Changes in the Uterus.*—Interstitial and sub-mucous tumours cause an enlargement of the uterus, with elongation and expansion of the uterine cavity. The total area of mucous membrane is thus increased, and in addition the mucous membrane is frequently the seat of adenomatous overgrowth. It becomes thickened and more vascular, while the glands are increased in number and in size. These changes in the mucous membrane are of importance in producing the common symptom of such tumours, namely, menorrhagia. A sub-peritoneal tumour may cause little alteration in the size of the uterus, especially if it be pedunculated. Such tumours as a rule cause no menorrhagia.

In cases of fibroid tumours of the uterus the ovaries are frequently cystic and enlarged. Whether there is any direct relationship between the two conditions is not definitely known.

When an interstitial or sub-mucous tumour attains a large size, the more or less uniformly enlarged uterus and tumour rise out of the pelvis into the abdomen in the same way as a pregnant uterus. By this upward growth the broad ligaments are lifted up and stretched as in pregnancy. The vessels in these ligaments entering and leaving the uterus become enlarged, so that when a stethoscope is placed over them through the anterior abdominal wall a blowing murmur, the uterine soufflé, can be heard. This is an important sign in distinguishing such tumours from ovarian tumours. The soufflé is of course not heard over a pedunculated sub-peritoneal tumour, because in such a case the uterus and



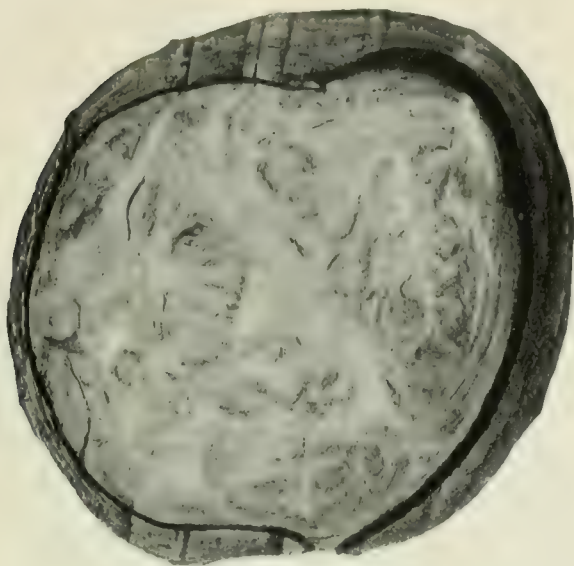


FIG. 107.—SUB-MUCOUS FIBROID TUMOUR OF THE UTERUS.

Uterus and tumour cut in vertical mesial section. Note the large tumour growing in the substance of one wall and projecting into the uterine cavity. This tumour is partly interstitial, partly sub-mucous.

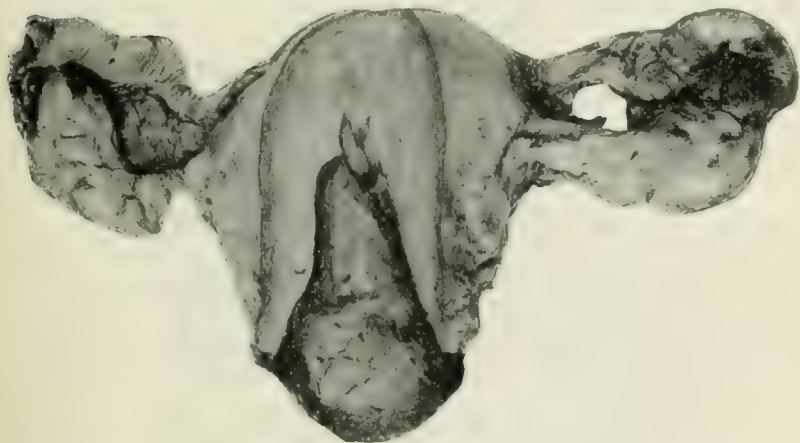


FIG. 108.—FIBROUS POLYPUS OF THE UTERUS.

The uterus is laid open from behind to show the neck of the polypus attached to the left side. The lower end projects through the dilated cervix.



the broad ligaments remain in the pelvis and so out of reach of the stethoscope.

The majority of fibroid tumours arise in the body of the uterus, but

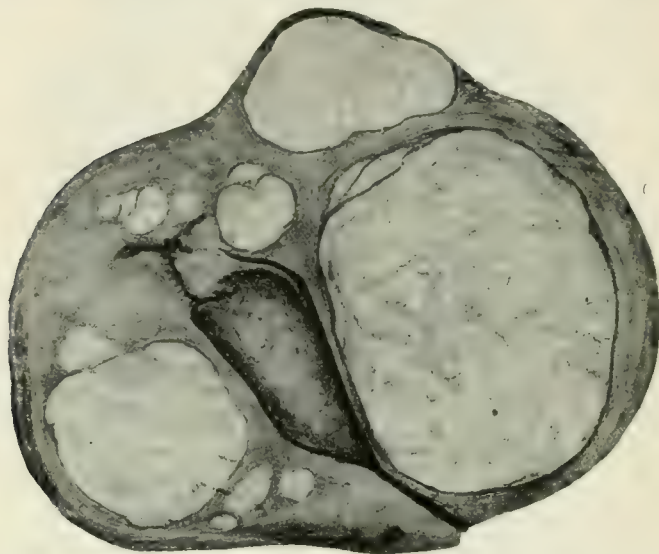


FIG. 109.—UTERUS WITH MULTIPLE FIBROIDS.

Uterus and tumour cut in vertical mesial section. Note the interstitial tumours of different sizes imbedded in the wall, and a sub-mucous one projecting in tongue-like fashion into the cavity.

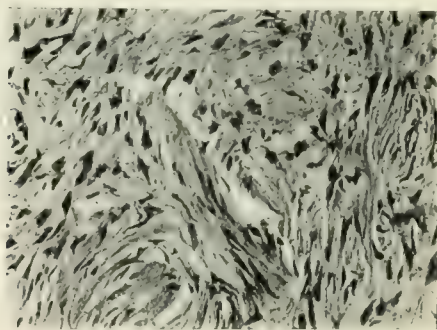


FIG. 110.—MICROSCOPIC SECTION OF UTERINE FIBROID.

occasionally they are met with in the cervix, usually growing from the supra-vaginal portion. These cervical tumours tend to grow outwards into the cellular tissue surrounding this portion of the cervix. They are

most often situated on the anterior aspect and expand forwards behind and underneath the bladder. They may attain a large size and soon cause bladder symptoms, beginning with irritability and often leading to retention of urine. The body of the uterus usually remains quite small and rests, as it were, on the top of the cervical tumour. Fig. 111 is a typical cervical fibroid growing from the anterior aspect of the cervix; the small body of the uterus is seen on the top of the tumour.



FIG. 111.—CERVICAL FIBROID.

The uterus and tumour are cut in vertical mesial section. The tumour is growing from the anterior aspect of the supra-vaginal part of the cervix. The body of the uterus is of normal size and seems to rest on the upper aspect of the tumour. The patient had severe bladder symptoms.

**Adeno-myoma.**—This is a tumour growing in the body of the uterus, consisting of fibrous and muscular tissue in which are imbedded islands of adenomatous tissue. It usually grows on the posterior wall or lateral aspect of the uterus, and differs from the ordinary fibroid in the absence of a capsule (fig. 112). On section it has the appearance of a localised thickening of the uterine wall. It may form a polypus as in fig. 113. The cut surface has a mottled appearance, owing to the presence of the adenomatous areas in it. They never attain a large size and are seldom met with bigger than the fist.

On microscopic examination the appearances are those of an ordinary fibroid, but at irregular intervals there are areas which present appearances very like those of the endometrium. There is a stroma of branching cells with little intercellular substance, and in this are glands lined by a

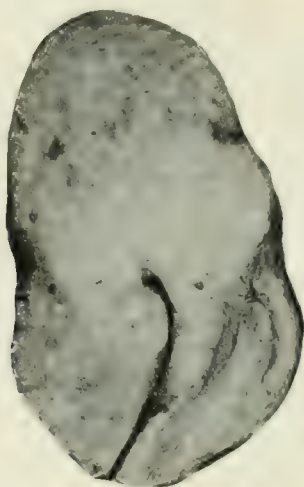


FIG. 112.—ADENO-MYOMA OF THE UTERUS.

Uterus and tumour cut in vertical mesial section. The tumour is growing from the fundus. Note the absence of a capsule, the diffuse nature of the growth, its small size and its mottled appearance on section, due to the presence of glandular areas.

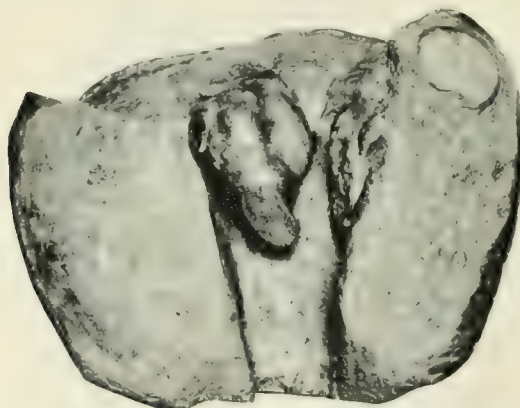


FIG. 113.—ADENO-MYOMA OF THE UTERUS.

Note the great thickness of the uterine walls produced by the diffuse growth. In one wall is a small interstitial fibro-myoma, and a mucous polypus projects into the lumen.

single layer of columnar epithelium. These glands vary greatly in size, some being narrow, others widely dilated. Fig. 114 shows the typical appearance of such areas. The origin of the glandular elements in these tumours is probably the endometrium. By serial section it is possible



FIG. 114.—ADENO-MYOMA OF THE UTERUS.

This differs from the ordinary fibroid in showing glandular areas. Such an area is shown above. It consists of a cellular stroma exactly like that of the endometrium and in it are imbedded spaces resembling uterine glands. The appearances suggest that these spaces have their origin from the endometrium.

in many cases to trace the connection. In cases where no such connection can be demonstrated, it has been thought that the glandular elements may be derived from the remains of Gartner's duct and are therefore Wolffian in origin.

### Clinical Phenomena.

*Etiology.*—Of the origin of fibroids nothing is known, though some would trace them to changes in the connective tissue round the blood-vessels. They are by far the most frequent new formation in the uterus. Their development is related to the period of sexual vigour, as appears from the table given in fig. 115. The statistics on which it is based deal with the age at which the patient sought advice, there being no data as to when the tumour began to develop. The curve corresponds to that of sexual vigour rising from puberty, reaching its highest point between the ages of thirty and forty, and dropping down after the menopause. It



used to be said that these tumours ceased to trouble the patient after the menopause, but extended clinical experience shows that this is not so. Hysterectomy for fibroids in patients over forty-five years of age is more frequent than this table would suggest. The ward records show, for this operation, a percentage of 46·2 cases between forty and fifty, and of 18·7 over fifty years of age.

*Symptoms.*—Hæmorrhage is the most characteristic symptom and shows itself as a gradual increase of the menstrual flow, the period extending to a week or ten days. The loss of blood may tell so markedly on the patient's strength that it is the chief reason for removal of the tumour. Intermenstrual hæmorrhage may also occur from ruptured vessels on the surface of a sub-mucous tumour. Painful menstruation is sometimes present. The weight of the tumour causes sensations of discomfort which the patient describes as 'fulness or weight in the pelvis' or 'bearing-down pain'. Pressure symptoms on neighbouring organs may be present, according to the situation of the tumour. Pressure on the bladder causes frequency of micturition, while pressure on the urethra causes difficulty and even retention. This is most likely to occur in the case of a cervical fibroid or one situated low down in the uterine wall.

Besides hæmorrhage, the other characteristic symptoms of a uterine fibroid are disturbances of the reproductive function, showing themselves in sterility or a tendency to abortion. As cancer is the tumour of the fertile, so a fibroid is the tumour of the sterile, though the etiological link runs in the opposite direction, fertility favouring cancer, fibroids favouring sterility.

These symptoms are determined by the situation of the tumour in the uterus. Hence the importance of the distinction into the three varieties described under Pathology—the sub-peritoneal, the sub-mucous, and the interstitial. It should also be borne in mind that, while uterine fibroids may grow outwards between the layers of the broad ligament, a fibroid tumour may develop from the connective and muscular tissue of the broad and round ligaments, forming a tumour the origin of which is determined only on abdominal section when the exact relations can be ascertained.

Taking the *sub-peritoneal* first, it may be said that if a fibroid grows towards the peritoneal cavity it does not materially affect the form of the uterus itself or its function, unless it be of great dimensions. It therefore produces no symptoms beyond those due to its size, or to the accident of its becoming wedged in the pelvis, when pressure symptoms may show themselves.

A *sub-mucous* fibroid, on the other hand, is more likely to be of clinical importance because of the enlargement of the uterus it produces and especially because of the changes in the uterine mucosa. It is this form of tumour that certainly causes hæmorrhage and often sterility.



FIG. 115.—TABLE AND DIAGRAM SHOWING FREQUENCY OF FIBROID TUMOURS ACCORDING TO AGE OF PATIENT.

NUMBER OF CASES.

Out of 919 cases

15 were below 20 years.  
 156 " between 20 and 30 years.  
 337 " " 30 " 40 "  
 338 " " 40 " 50 "  
 36 " " 50 " 60 "  
 12 " " 60 " 70 "  
 5 " above 70 "

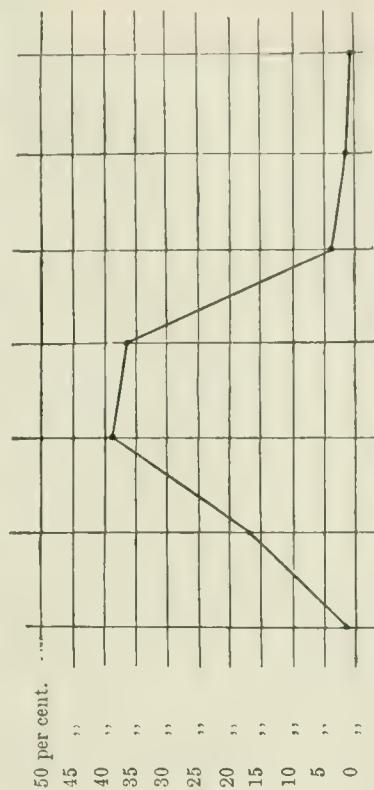
(Hasseroit.)

PERCENTAGE PROPORTION.

AGE.

PERCENTAGE.

Below 20 to 30. 30 to 40. 40 to 50. 50 to 60. 60 to 70. Above 70.



The exact percentage is 1.6, 16.9, 38.8, 36.7, 3.8, 1.3, .5.

There is this further interesting fact in its pathological history, that once a sub-mucous fibroid has begun to bulge into the uterine cavity the uterus treats it as a foreign body and begins to expel it as it would an ovum. The mucosa over the tumour stretches and the tumour becomes pedunculated, and, still carrying the uterine mucosa before it, is borne into the cavity of the cervix and finally into the vagina as 'a fibrous polypus'. This process of birth, which may extend over many months, is accompanied by hæmorrhage, sometimes by distinct uterine contractions like labour pains with dilatation of the cervix. Expulsion takes place most markedly at the menstrual period, perhaps because the tumour is then distended with blood or the uterus more irritable. Sometimes there is the curious phenomenon of a tumour presenting through the os only during the monthly period and receding in the interval. In such cases examination during menstruation is necessary.

The *interstitial* is the commonest type of fibroid tumour. These tumours are frequently multiple, but usually one grows to a considerable size, forming with the uterus a mass which may rise to the umbilicus. On section the uterine cavity appears as a mere slit, curving round one face of the tumour according as the latter has grown in the substance of the anterior or posterior wall. The cavity may be increased 8 or 10 inches in length, and this increase in the extent of the uterine mucosa is probably one factor in the increased flow at the period.

*Physical Signs.*—In considering the diagnosis of these tumours from the physical signs, it is convenient to look first at the recognition of small fibroids, *i.e.* lying within the pelvis, and then at large fibroids, *i.e.* tumours occupying the abdomen.

A small fibroid is recognised by careful bimanual examination, supplemented if necessary by the sound. The tumour is of such a size that it and the uterus can be grasped between the hands and the relation of the one to the other made out. When tumour and uterus form one mass, the passage of the sound determines the position of the uterine cavity and the relation of the tumour to it. When a fibrous polypus is suspected, it is necessary to dilate the cervix so as to pass the finger into the uterine cavity. A fibroid may simulate normal pregnancy, but the uterus is firmer and there is no amenorrhœa. Pathological pregnancy with hæmorrhage, *e.g.* hydatid mole or a dead ovum, closely simulates a fibroid, and a diagnosis may only be possible after watching the case for some time.

A large fibroid rising up into the abdomen presents many characteristic features, for the recognition of which the systematic examination of the abdomen referred to on pages 7–11 is required. There is a history of gradual growth, extending over months, sometimes years. Its effect on menstruation is also noted, pregnancy causing amenorrhœa while a fibroid causes menorrhagia. The contour of the abdomen may

be suggestive, the abdominal wall dropping more suddenly towards the epigastrium in the case of a fibroid than in the case of pregnancy or an ovarian cyst (see figs. 1 and 2).

Palpation reveals a tumour of firm consistence as distinct from the soft pregnant uterus or a tense ovarian tumour. Further, the contour may be irregular, but the consistence is uniform.

On auscultation a uterine souffle may be heard.

Looking now at its relation to the pelvis and especially to the uterus, we note on making pressure above the pubes that we have to deal with a tumour rising upwards out of the pelvis. Its relation to the uterus can only be made out on vaginal examination aided by the bimanual and sound. Sometimes there can be recognised alongside of the tumour the form of the uterus, which however passes into the tumour and moves *en masse* with it; or the cervix is felt as a knob on the pelvic end of the mass, which consists of the enlarged uterus plus the tumour. The volsella is of use to fix the cervix and to determine the mobility of the mass relative to it, and the sound to determine the direction and length of the uterine cavity. The cases which present difficulty of diagnosis are those of abnormal pregnancy, *e.g.* a dead fœtus which cannot be palpated, or hydatid mole with irregular hæmorrhages. Diagnosis becomes still more difficult in some cases of extra-uterine pregnancy, as there may be a tumour beside the uterus closely resembling a fibroid with inflammatory exudation round it. Time or the knife alone will tell.

#### DEGENERATIVE CHANGES IN FIBROID TUMOURS.

In certain cases changes of a degenerative character occur in fibroid tumours. As a rule active growth ceases at the menopause, and any symptoms which have been present may at this time disappear. Formerly patients were encouraged to await this cessation of growth rather than to submit to an operation for the removal of the tumour. Of late years we have come to recognise, however, that whilst in a certain proportion of cases symptoms may cease, in a considerable number degenerative changes occur in the tumour which result in aggravation of symptoms or in the appearance of fresh ones. Further, a woman with a fibroid tumour nearly always has a delayed menopause. For these reasons operation is now advised whenever a fibroid tumour is giving rise to marked symptoms.

The chief degenerative changes which occur are atrophy, calcification, hyaline degeneration, mucoid and myxomatous degeneration, cystic degeneration, necrobiosis, and sarcomatous changes.

**Atrophy.**—Many cases have been described where a fibroid tumour has diminished greatly in bulk or has entirely disappeared. A number of the cases so described have doubtless been wrongly diagnosed, but some well-authenticated cases remain. This atrophy and shrinking of

the tumour may occur after childbirth but more frequently after the menopause. At both these times other forms of degeneration are more common. Necrobiosis, for instance, is the commonest degenerative change after childbirth.

**Calcification.**—This change results from a deposit of lime salts, chiefly phosphates, in the tumour. It may occur in interstitial or in sub-peritoneal tumours, but is most frequent in the latter. As a rule it begins at or after the menopause. The calcification may occur in scattered areas throughout the tumour or may be generalised so that the whole mass becomes stony—the so-called ‘womb-stone’. The tumour becomes heavier, and this increased weight and the feeling of bearing-down are the only symptoms of which the patient complains. If the tumour is sub-peritoneal and has a narrow pedicle, the latter may give way and the calcified mass become free in the peritoneal cavity, surrounded as a rule by omentum.

**Hyaline Degeneration.**—In some cases the fibres undergo a hyaline change. Such tumours are densely hard, and microscopically present the

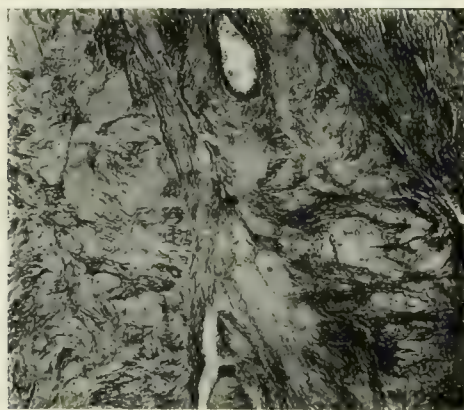


FIG. 116.—UTERINE FIBROID—HYALINE DEGENERATION.

Note the hyaline change in the tissue.

appearance shown in fig. 116. The outline of the individual fibres is lost and the staining is diffuse.

**Mucoid and Myxomatous Degeneration.**—Mucoid and myxomatous degeneration may occur at any time in the life-history of the tumour, but is most frequently met with at or after the menopause. Areas of the tumour become softened (fig. 117). When examined microscopically, these areas show mucoid and myxomatous change. The fibres are widely separated and degenerated. The softening may go on to such an extent as to result in the formation of fluid, and when the areas are large

one form of fibro-cystic tumour is produced. A rapid increase in the size of the tumour, together with softening, indicates this change.

**Cystic Degeneration.**—This may result from an extensive mucoid and myxomatous degeneration, or may be produced as the result of dilatation

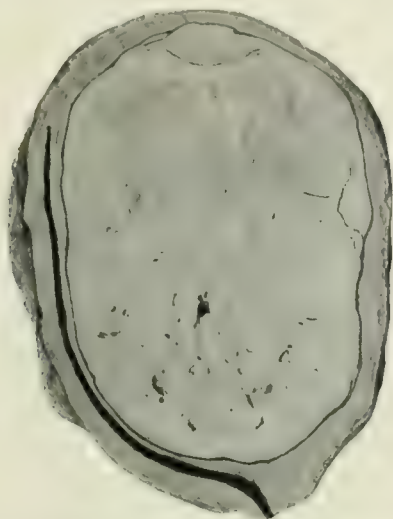


FIG. 117.—UTERINE FIBROID WITH CYSTIC DEGENERATION.

The tumour is a large interstitial one growing from the posterior wall. In its lower part are many spaces filled with clear fluid.

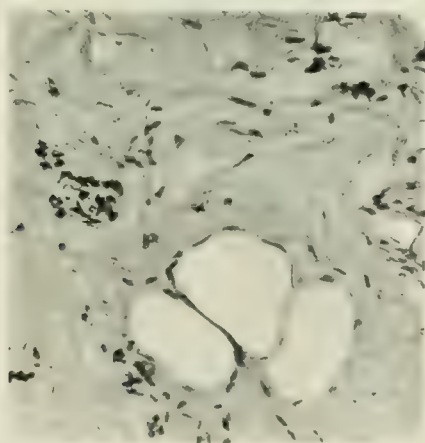


FIG. 118.—UTERINE FIBROID—CYSTIC DEGENERATION.

The cystic character is due partly to a mucoid degeneration and partly to lymphatic dilatation. The dilated lymph spaces with endothelial lining are distinctly seen.



of the lymph channels. The cystic spaces vary in size. When large, they give the tumour a fluctuating character when felt through the abdomen. The formation of these cystic spaces leads to a rapid increase in the size of the growth. When the spaces are formed by dilatation of the lymphatics, microscopic examination shows that the lining of the cysts is an endothelium (fig. 118).

Sometimes the spaces are filled with blood, and are dilated vessels. To this the term *telangiectatic* fibroid has been applied (fig. 119). We

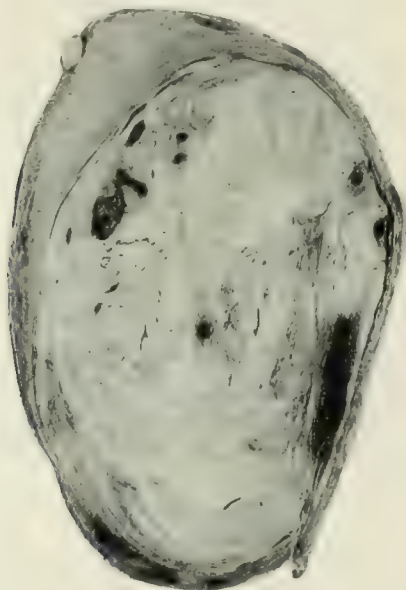


FIG. 119.—TELANGIECTATIC FIBROID.

Note the large spaces filled with blood in the substance of the tumour.

have seen a large blood cyst develop due to hæmorrhage into a fibroid from the development of perithelioma.

**Necrobiosis, or Red Degeneration.**—This is probably the commonest degenerative change met with in fibroid tumours. It is at the same time the one which gives rise to the most characteristic symptoms and physical signs. It occurs most frequently during pregnancy, in the puerperium, or about the time of the menopause. Lorrain Smith and Shaw ascribe the change to thrombosis causing retardation of the circulation, which leads to a production of fat: and the accumulated lipoids have a hæmolytic action and favour the staining of the tumour with hæmoglobin. The appearance produced is characteristic. The tumour, instead of presenting the pearly-white colour of the ordinary fibroid, acquires



UTERINE FIBROID UNDERGOING NECROBIOSIS OR 'RED DEGENERATION'



a pink or deep red purple hue (see Plate IV.). It loses its firmness and becomes soft. There is a diffusion of blood-pigment throughout the tissue; the individual fibres are degenerated so that their outlines are indistinct, and the nuclei stained faintly or not at all (fig. 120). In more advanced cases there is an actual necrosis of the tissue, leading to the formation of spaces within the tumour filled with degenerated blood and debris. Such dead tissue may become infected with the bacillus coli, leading to abscess formation in the tumour.

This change is accompanied by definite symptoms. The tumour, formerly painless, becomes painful. On palpation there is marked

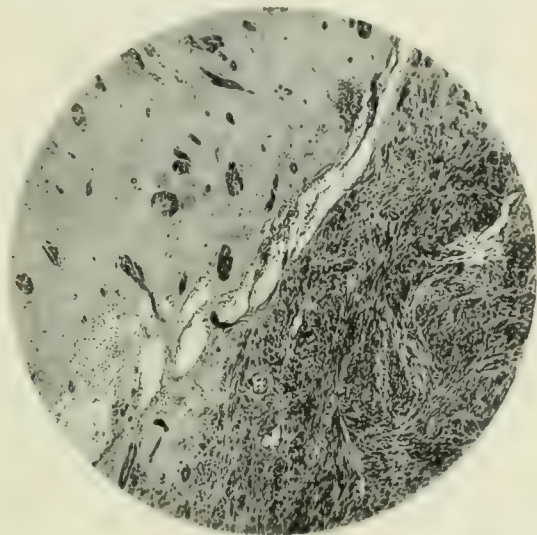


FIG. 120.—UTERINE FIBROID—UNDERGOING RED DEGENERATION.

To the right the appearances are more or less normal. To the left, where necrobiosis is present, the nuclear staining is lost, the outlines of the fibres have disappeared and there is blood pigment throughout. Only small islands of healthy tissue are left.

tenderness, and there is rapid increase in the size of the growth with slight elevation of temperature and increased rapidity of pulse. When such symptoms and signs are present, operation should be advised, otherwise complete necrosis and suppuration may occur. Careful watch for the development of this condition should always be kept on a patient with a fibroid tumour who is pregnant or who has recently been delivered. Why the change should occur particularly during pregnancy or the puerperium is not at present clear.

**Sarcomatous Degeneration.**—In a small proportion of cases a simple

fibroid may be converted into a sarcoma. Whether this results from a direct transformation of fibrous tissue and non-striated muscle cells into sarcoma cells, or whether it is an invasion of the tumour by a sarcoma, is not definitely determined. Microscopically, it is often extremely difficult to say whether the tumour is a rapidly-growing fibroma or fibromyoma, or a spindle-celled sarcoma. Many of the cases described as sarcomatous degeneration of a fibroid are really only young rapidly-growing fibromyomata. In a typical case the sarcomatous areas are soft and brain-like in consistence and contain small hæmorrhages. Microscopically, they are composed of spindle-shaped cells with large irregular nuclei, very scanty intercellular substance, and thin-walled blood-vessels



FIG. 121.—UTERINE FIBROID—SARCOMATOUS DEGENERATION.

Note the very cellular character of the tissue and the thinness of the vessel walls in the sarcomatous (darker) portion of fibroid.

(fig. 121). The growth invades the capsule of the tumour and extends into the surrounding muscular wall. These cases must be distinguished from cases of primary sarcoma of the uterus, which may result in the formation of a large tumour.

Clinically, sarcomatous degeneration shows itself by rapid increase in the size of the tumour and by increased hæmorrhage. The malignancy seems to vary, but is usually of a low type.

*Carcinomatous degeneration* has also been described. This is, however, not a degeneration, but an invasion of the tumour from carcinoma originating elsewhere, either in the endometrium or in the cervix. In the adeno-myoma the glandular elements may take on a carcinomatous character.



## SARCOMA OF THE UTERUS.

Sarcoma of the uterus is not such a frequent condition as was formerly supposed. Many of the cases which we now know to be adenocarcinoma were described as sarcoma. The disease may arise in the connective tissue of the endometrium, in which case it tends to be of a diffuse character spreading over the whole surface. It may begin as a localised nodule in the muscular wall of the uterus, and many cases have now been described where it takes origin in a previously existing fibromyoma. The tumour has the naked-eye characters of sarcomata in other situations. It is of soft consistence, of a whitish or yellowish colour on section, and contains areas of hæmorrhage and necrosis. It may attain a



FIG. 122.—SARCOMA OF UTERUS.

Section through centre of the tumour showing the uterine cavity and, growing in one wall, a large tumour which projects markedly into the cavity. In the centre of the growth are areas of hæmorrhage and it has invaded the muscular wall so as to reach almost to the peritoneal surface.

considerable size and in its growth extend towards the peritoneum or the mucous membrane. In the latter case, parts of the tumour become polypoidal and may be expelled through the cervix into the vagina. Fig. 122 shows such a case. The tumour is bulging into the lumen of the uterus, and previous to hysterectomy being performed, several large masses were removed *per vaginam*. Microscopically, the characters of the tumour vary. It may be of the ordinary spindle-celled type, and a variety has been described where the cells are apparently directly derived from the non-striped muscle cells. It is often extremely difficult to say whether a soft fibroid is the seat of a sarcomatous change. The principal

distinguishing points of the sarcoma are the thinness of the vessel walls, the absence of intercellular substance, and the large size and irregular shape of the cells. In addition to these spindle-celled varieties a mixed-celled sarcoma is also met with. Fig. 122 was such a case, and fig. 123 shows the microscopic appearances. It will be seen that cells of all varieties are present, round, spindle and giant.

Within recent years other forms of malignant new growth have been described under the names of *endothelioma* and *perithelioma*. The endothelioma is a tumour, the cells of which are derived from the endothelium of blood-vessels or lymphatics. In the perithelioma the cells also are of endothelial origin and are supposed to arise from the

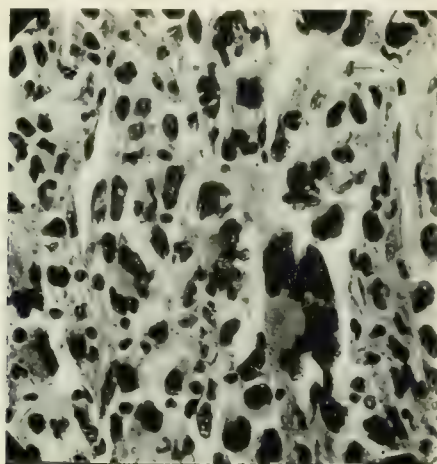


FIG. 123.—SARCOMA OF UTERUS.

Section through tumour shown in fig. 122. It is of the mixed-cell type, there being spindle, round and giant cells present.

perivascular lymphatics, so that they come to be arranged round the lumina of the blood-vessels. The general trend of opinion among pathologists is to classify such tumours as sarcomata. Fig. 124 shows a perithelioma of the uterus. It has all the characteristics of a sarcoma. It is soft in consistence, contains areas of necrosis and hæmorrhage, and is eating into the muscular wall. In figs. 125 and 126 the microscopic characters of the tumours are shown. In the low-power view (fig. 125) the blood-vessels are seen with their endothelial walls intact, surrounded by the tumour-cells. Outside these are areas of necrosis. Under the higher power (fig. 126) we note that the tumour-cells are arranged in a direction radial to the vessel and are large and irregular in shape. Whether such tumours should be separately classed as perithelioma or

simply referred to as perithelial sarcoma is a matter of opinion. Clinically, their malignancy varies, but as a rule they run the same course as the ordinary sarcoma.

In the cervix another type of sarcoma is met with known as the 'sarcoma botryoides', so called from its grape-like appearance. It may

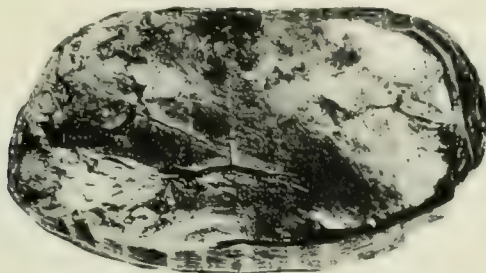


FIG. 124.—PERITHELIOMA OF UTERUS.

The naked-eye characters are very like those of the ordinary Sarcoma. Note the thinning of the uterine wall.

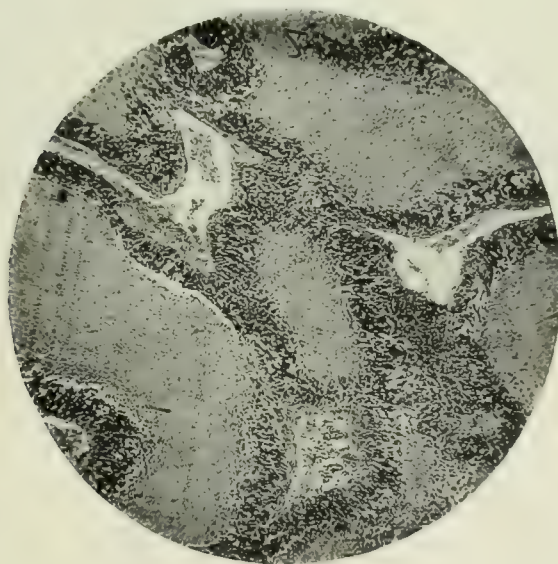


FIG. 125.—PERITHELIOMA OF UTERUS.

Section of tumour shown in fig. 124. In the centre of the field is a large blood-vessel lined with endothelium. Arranged round it are the tumour-cells set more or less radially. These cells are supposed to take origin from the perivascular lymphatics.

occur in quite young children and takes the form of a fungating growth which may fill up the whole of the vagina.

**Clinical Phenomena—Etiology.**—Sarcoma is most frequently present in nulliparous women or in those with a small family. It may occur at any age, but is most usual in later life.

**Symptoms.**—These are practically the same as those in cancer of the body of the uterus, namely, irregular uterine hæmorrhage; leucorrhœal discharge, at first watery in character, later blood-stained and fœtid. Pain is not so marked a feature as in cancer. General symptoms due to metastases come on later.

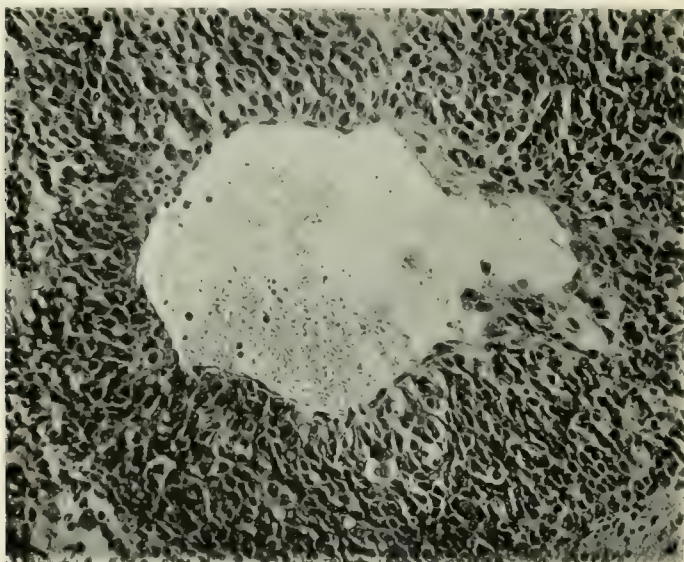


FIG. 126.—PERITHELIOMA OF UTERUS.

High-power view showing vessel surrounded by malignant cells.

**Physical Signs.**—In the early stages all that is detected is some enlargement of the body of the uterus, and in such cases diagnosis can only be made by a curettage and microscopic examination of the scrapings. Later on, on vaginal examination, the lower protruding pole of the tumour may be felt coming through the cervix. It is extremely soft, bleeds readily, and may be extremely fœtid. It is distinguished from a simple sloughing fibrous polypus by its softness and by its microscopical characters. If the disease arises in a fibroid, there is an increase in the amount of hæmorrhage and the more rapid growth of the tumour can be noted. Every fibroid which takes on rapid growth ought to be removed.



## AFFECTIONS OF THE FALLOPIAN TUBE.

## Anatomy and Histology.

From the uterus we pass to the consideration of affections of its appendages—the Fallopian tube and ovary. The Fallopian tube is the canal by which the ovum passes from the ruptured Graafian follicle into the uterine cavity, and in which its fertilisation usually takes place. Its form, position and relations will be evident from the drawing of the posterior view of the upper part of the left broad ligament given in fig. 127. The tube runs straight out from the uterine cornu in the narrow

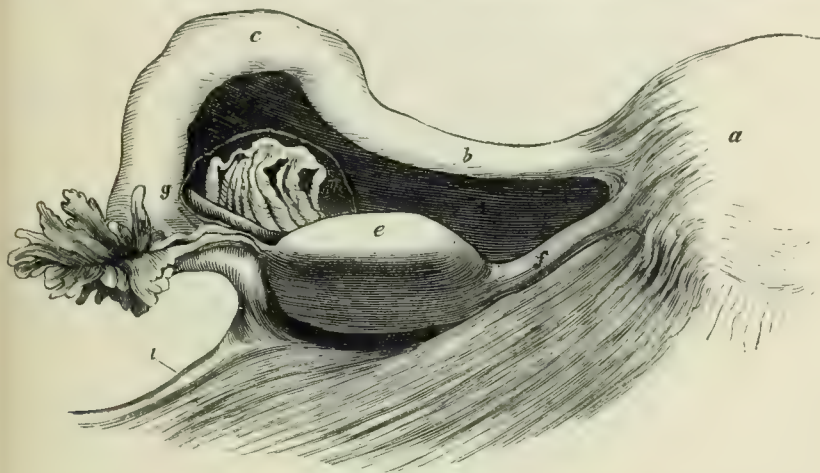


FIG. 127.—VIEW FROM BEHIND OF THE LATERAL ANGLE OF THE UTERUS, WITH PART OF THE LEFT BROAD LIGAMENT, FALLOPIAN TUBE, OVARY AND PAROVARIIUM.—(HENLE.)

*a.* Uterus; *b.* Isthmus of Fallopian tube; *c.* Ampulla; *g* has parovarium to the right, and fimbriated end of Fallopian tube and ovarian fimbria just below it; *e.* Ovary; *f.* Ovarian ligament; *l.* Infundibulo-pelvic or ovario-pelvic ligament.

*isthmus*, curving backwards in the wide *ampulla* to terminate in the *fimbriated end*. It occupies the greater part of the upper border of the broad ligament. The free margin of broad ligament unoccupied by the Fallopian tube is called the infundibulo-pelvic ligament, because it passes from the infundibulum of the tube to the side wall of the pelvis. It is also known as the 'ovario-pelvic' ligament, and 'suspensory ligament' of the ovary (see also fig. 8). Two points regarding this ligament are noteworthy. It slings the uterine appendages to the side wall of the pelvis; were it not for this ligament, the ovary and tube would hang free.



Further, it contains the ovarian artery, and by tying it the greater part of the blood-supply to the appendages is controlled. Not all of it however, because the terminal branches of the uterine artery, passing outwards in the broad ligament from the upper angle of the uterus, anastomose with the terminal branches of the ovarian.

The tube is composed of three coats, peritoneal, muscular and mucous. The peritoneal coat is formed by the upper part of the broad ligament and thus forms a continuous investment except on the under aspect, where the tube-wall is in relation to the cellular tissue between the layers of the broad ligament. At the fimbriated extremity it is continuous with

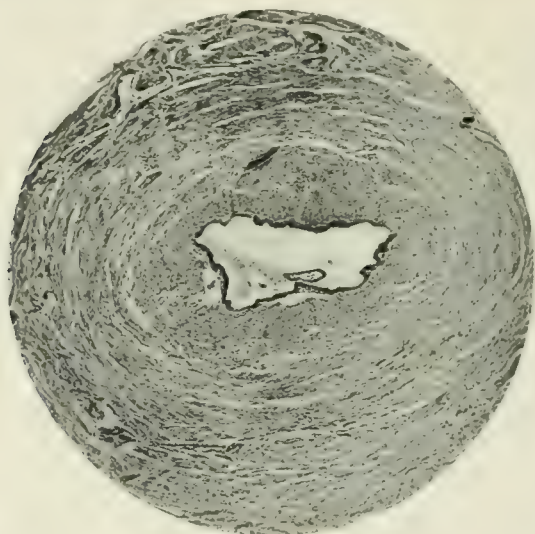


FIG. 128.—TRANSVERSE SECTION OF UTERINE END OF TUBE.

Contrast with fig. 129.

the mucosa of the tube. The muscle of the tube is arranged in two layers, an outer longitudinal and an inner circular. Between the two is a thin layer of loose fibrous tissue. The mucous membrane is thin and is composed of a fibrous tissue stroma covered with a single layer of ciliated columnar epithelium. The mucous membrane is arranged in a series of longitudinal folds which increase in number from the isthmus to the infundibulum. Cross sections of the tube in these situations thus present different appearances. Fig. 128 is a transverse section of the isthmus. Fig. 129 is a transverse section of the ampulla of the same tube, in which the mucous membrane projects into the lumen in the form of papillæ. Each fold has a core of connective tissue and is covered with a single layer of columnar epithelium. These folds meet in the middle line

and thus give the lumen of the tube a sieve-like appearance. The ciliary current in the tube is from the outer towards the uterine extremity, and

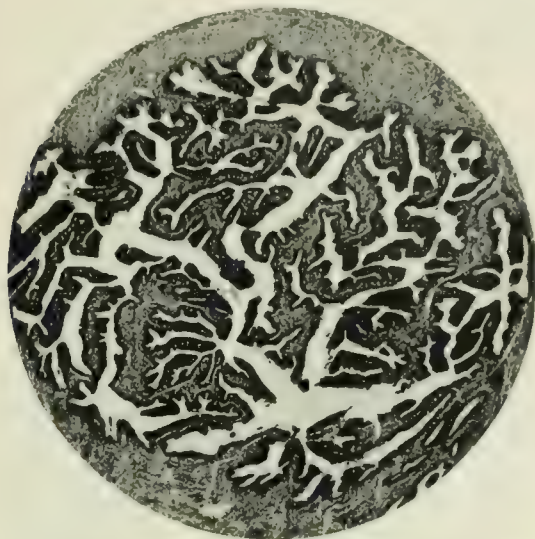


FIG. 129.—TRANSVERSE SECTION OF AMPULLA OF TUBE.

The mucous membrane is thrown into a series of folds, each covered with a single layer of columnar epithelium. There are no glands.

it doubtless plays a part in accelerating the progress of the ovum into the uterus.

#### INFLAMMATION OF THE TUBE—SALPINGITIS.

The Fallopian tube is frequently the site of inflammation. The infecting organisms may reach it by four different routes. They may gain access to the lumen from the interior of the uterus; they may reach it from the peritoneal cavity, being sucked in by the ciliary current at the ostium, or they may travel through the tube-wall when intestinal adhesions are present; finally, they may invade the tube through the blood or lymph stream.

Various micro-organisms are found in tubal inflammation. The gonococcus is one of those most frequently met with, the infection in this case spreading from below. Streptococci and staphylococci are also frequently found, the invasion being also usually from below. In both of these cases, as the result of the inflammatory reaction, the tube is apt to become adherent to the bowel and a secondary bacillus coli infection results. This infection may also be primary. The pneumococcus has been found in cases of pneumococcal peritonitis. Tuberculous salpingitis

is common in cases of abdominal tuberculosis and by many is regarded as the starting-point of the latter.

Owing to the anatomical relations of the tube, it is seldom that a salpingitis remains localised. If the infection has been from below, there is always a tendency for it to extend from the fimbriated end and to involve the peritoneum and structures in the vicinity. For this reason gonorrhœa is a much more serious condition in the female than in the male. The peritonitis which results from this extension of infection usually remains confined to the pelvic peritoneum, but may become



FIG. 130.—SALPINGITIS.

Transverse section of tube. The mucosal folds are swollen and injected.

generalised over the whole abdomen. The effects on the tube itself vary in different cases, and we shall describe these in some detail.

**Acute Salpingitis.**—The infecting organism may be the gonococcus, streptococcus, staphylococcus, pneumococcus, or bacillus coli. As a rule the infection takes place on the mucous surface and very soon the whole extent of this surface becomes involved. The mucous membrane becomes swollen and œdematous, so that in the ampulla and infundibulum the folds are so thickened as to impinge upon each other and practically to block the lumen (fig. 130). The mucosa of the fimbriæ becomes correspondingly congested. An increased amount of secretion results which is at first serous and later purulent. The surface epithelium proliferates and, if the inflammation continues, is killed and desquamates (fig. 131). The muscular coat becomes œdematous and infiltrated with inflammatory

cells (fig. 132), and in streptococcal cases small localised abscesses may be produced. The peritoneal coat is injected and in the later stages is covered with a serous exudation which leads to the formation of adhesions. To the naked eye, such a tube is thicker, more tortuous, and of

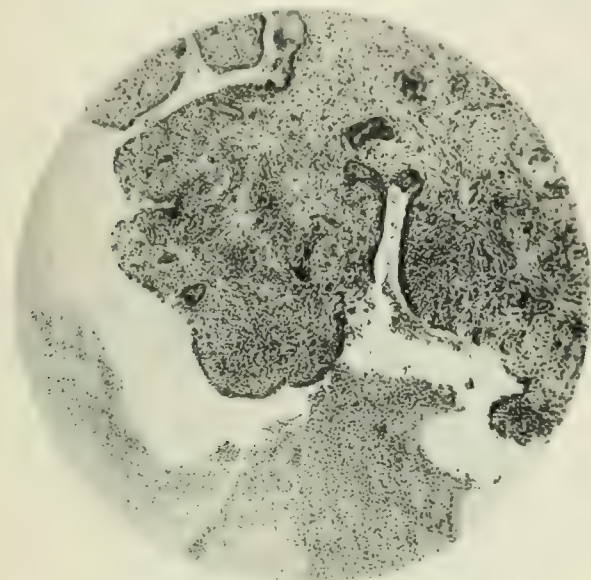


FIG. 131.—SALPINGITIS.

One of the folds of mucous membrane more highly magnified, showing the cellular infiltration and desquamation of epithelium.

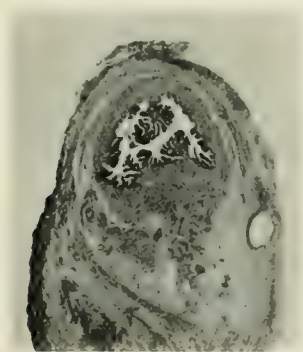


FIG. 132.—SALPINGITIS.

Transverse section of tube. The whole tube wall and mucous membrane are swollen and edematous.



a brighter red colour than normal. The fimbriated extremity is swollen and pouting in character. There are usually inflammatory adhesions between it and the ovary and surrounding structures.

The subsequent course of such an acute salpingitis varies. The inflammation may subside completely, leaving behind some slight fibrous thickening of the tube-wall and a few adhesions about the fimbriated extremity. In other cases, as the result of the desquamation of the surface epithelium (fig. 131), adhesions may form between the folds of mucous membrane, causing a narrowing of the lumen or even a complete obstruction. The acute inflammation may pass into a chronic inflammation, as the result of which a marked inflammatory reaction (fig. 133) takes place in the walls of the tube, causing them to be greatly thickened.

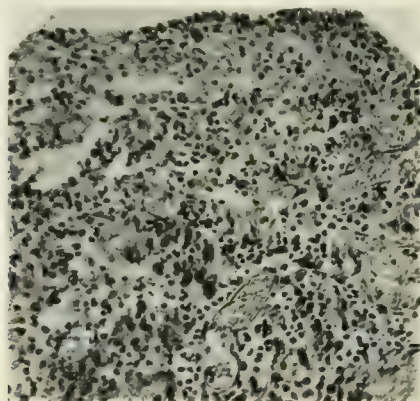


FIG. 133.—WALL OF PYOSALPINX.

Note the dilated vessels and inflammatory cells. The epithelial covering has disappeared from the surface of the mucosa, in upper part of section.

In some such cases the tube may be increased to the thickness of the thumb. In such thickened tubes the tortuosity is always more marked than normal. The tube lumen is usually dilated and filled with mucoid or purulent contents.

Inflammation usually affects ovary and tube together, so that clinically we speak of 'inflammation of the uterine appendages'. In many cases of 'cystic ovaries' there is chronic salpingitis. Plate I. shows the appearance of moderately thickened tubes.

If, as the result of the swelling of the tube in the acute stage or as the result of the fimbriae at the extremity becoming adherent, the outer end of the tube should be closed, the lumen becomes dilated with the retained secretion and a pyosalpinx is the result. Such a dilated tube always assumes a characteristic form. The narrow isthmic portion next



the uterus is practically undilatable and remains of comparatively normal thickness. The ampulla, however, readily dilates and so also does the infundibulum. A swelling aptly described as retort-shaped is thus produced. Figs. 134 and 135 show this very well. Tubes distended in this way may attain a large size. As the result of intestinal adhesions there is often a secondary bacillus coli infection, and when this occurs the original infecting organism frequently dies out. After a time the bacillus coli also dies, and there is left a tube distended with pus, often foul-smelling but sterile. The fact that the pus in these cases may become sterile is very important practically. It frequently happens that, in the removal of such tubes, pus escapes into the peritoneal cavity, but being sterile it gives rise to no trouble. Having diagnosed a pyosalpinx,



FIG. 134.—PYOSALPINX.

The uterus has been removed along with the tube and both are viewed from the posterior aspect. Note the thinness of the uterine end of the tube as compared with the widely dilated outer end, giving typical retort appearance.

it may be best to wait until all acute symptoms have disappeared before opening the abdomen, in the hope that the organisms have died out. Operation can then be much more safely undertaken.

**Clinical Phenomena.**—The *etiology* has been indicated in discussing the infecting organisms. The mode of onset varies with the nature and virulence of these organisms. In some cases it is sudden. There is acute pain in the lower abdomen, sometimes in the middle line, more often towards the side affected. The pulse is increased in rate and there is elevation of temperature. The lower abdomen does not move with respiration as freely as normally. On palpation over the brim of the pelvis rigidity of the muscles is detected, and there is localised tenderness on deep palpation. It may be difficult to distinguish between a mild attack of appendicitis and a right-sided salpingitis, especially if the appendix be hanging over the pelvis. Usually, however, the area of tenderness in

salpingitis is at a lower level than in appendicitis. The history also aids in differential diagnosis: in appendicitis there are intestinal symptoms and the attacks are at irregular intervals, while in inflammation of the appendages the pain is usually increased at the monthly period. On vaginal examination very little may be detected in the initial stages, except some tenderness on palpating through one or both lateral fornices. In the later stages, when the tube has become thickened or distended with pus, a distinct swelling can be felt on bimanual examination in the lateral or posterior fornix. In cases where the tubes are greatly dilated and adherent to each other behind the uterus, the swelling may fill up the pouch of Douglas. Where a secondary cellulitis or localised peritonitis with effusion has formed, the whole pelvis is filled with an inflammatory mass of irregular outline and firm consistence but with softer areas. At this later stage it is often impossible to distinguish between a pure cellulitis and a pyosalpinx densely adherent, with secondary inflammatory involvement of the peritoneum and cellular tissue. This will be referred to again in considering these conditions.

While the diagnosis of salpingitis in the early acute stage is difficult, the condition being readily mistaken for appendicitis, in the later stages, when there is thickening of the tube-wall or a *pyosalpinx*, diagnosis is as a rule easy. The presence of an elongated, fixed, tender, hard swelling at the side of the uterus is nearly always indicative of tubal mischief (see fig. 134). Even in such cases it is easy to make a wrong diagnosis. The chronically inflamed appendix with matted omentum over it, adherent to the back of the right broad ligament, closely simulated in one case a pyosalpinx. In another case a cancer in a loop of the pelvic colon led to a similar mistake. Such conditions must therefore be kept in mind and, if possible, excluded by a careful consideration of the history of the case.

#### TUBERCULOUS SALPINGITIS.

Tuberculosis of the tube may take two forms. It may be present as a miliary tuberculosis over the surface and in the substance of the tube-wall, and is then usually associated with a generalised tuberculous peritonitis. Or it may take the form of a pyosalpinx, the tube lumen becoming greatly dilated and filled with caseous material and pus, a condition sometimes described as 'cold abscess' of the tube. This latter form is often the only manifestation of tubercle within the abdominal cavity, and frequently no other tuberculous lesion can be found. In fig. 135 a typical example of miliary tubercle is seen. The tube is thickened, somewhat dilated towards its outer extremity, which gives it a retort shape. The peritoneal surface is injected and covered with tubercle nodules. The ovary was also affected, and similar tubercle nodules were present throughout the peritoneum.

Fig. 136 is an interesting example of a double tuberculous pyosalpinx, or cold abscess of the tube. The distension of the right tube in this case is enormous, as can be seen by comparing it with the uterus. Clinically, it was found to reach to the level of the umbilicus and was diagnosed as an ovarian cyst as there was no history or symptoms of tuberculosis.

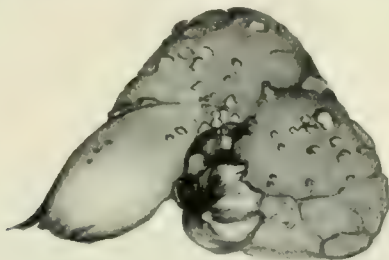


FIG. 135.—TUBERCULOUS TUBE.

Note the miliary tubercles on its surface.



FIG. 136.—TUBAL TUBERCULOUS PYOSALPINX REMOVED ALONG WITH THE UTERUS.

Note the size of the right tube as compared with that of the uterus.

Microscopic examination of this tube shows that the tuberculous process has begun in the mucous membrane and is most advanced in the dilated portion. At the uterine end the tubercle nodules are few in number, and caseation has not occurred. The smaller left tube represents the amount of distension more usually found.

As the result of the tuberculous process, proliferation of the epithelial covering of the mucous membrane occurs. Cohesion of adjacent processes of mucous membrane takes place, so that a solid tissue with epithelial strands included in it is produced. Fig. 137 is a section of the mucous membrane of the left tube in fig. 136. The solid masses and clumps of epithelial cells present an appearance almost like carcinoma. Between these epithelial masses, typical tubercle nodules with giant cells are present. As the tuberculous process advances, the epithelial cells degenerate and the mucous membrane becomes converted into a breaking-



FIG. 137.—SECTION OF MUCOSA FROM TUBERCULOUS TUBE.

The epithelium forms solid masses and between them are tubercle nodules. The appearances are very like carcinoma.

down tissue and completely destroyed. There always remains, however, an epithelial covering shutting off the muscular wall of the tube from the tuberculous invasion. In the widely dilated part of the right tube a process of natural cure has occurred. The lining in this situation shows a layer of healthy granulation tissue, with only an occasional tubercle nodule, and a covering of low columnar epithelium.

The uterine end of the tube is the part which should always be examined when tubercle is suspected, and the appearance of the wall is seen in fig. 138.

When the tube is affected with tubercle it is common to find also a tuberculous invasion of the connective tissue and peritoneum of the broad



ligaments. This results in the formation of a mass of tuberculous material in the pelvis, which shows itself clinically as a dense immobile swelling stretching across the pelvis and in some cases rising up above the pelvic brim, closely simulating a cellulitic exudation.

**Clinical Phenomena—*Etiology.*** In some cases there is evidence of tubercle elsewhere which has been the starting-point of the pelvic affection. In others, the most careful examination fails to reveal any such primary focus. The possibility of the presence of old tuberculous mesenteric glands must, however, not be lost sight of. Cases have been recorded

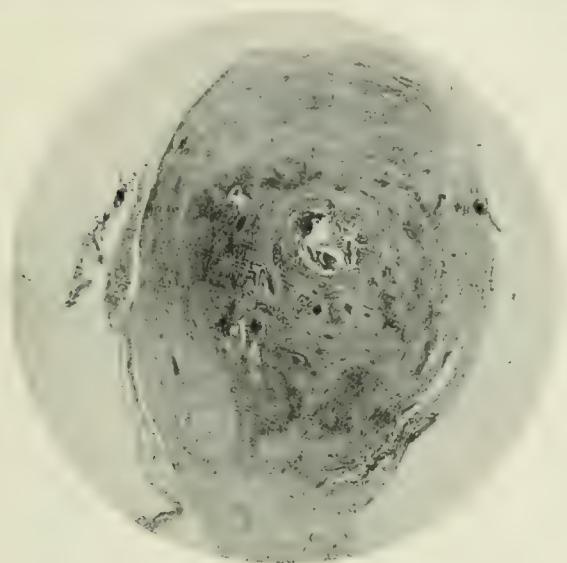


FIG. 138.—UTERINE END OF TUBERCULOUS TUBE.

There is no tubercle in the mucosa, but the tube wall is greatly thickened and contains many tubercle nodules.

where apparently the infection occurred from below, the primary focus being in the cervix or uterus. Tuberculous tubes are generally associated with a generalised tuberculous peritonitis. In such cases the condition is most marked in the tubes; and by many, these are regarded as the starting-point of the abdominal tubercle.

**Diagnosis.**—In a typical case the patient presents the symptoms associated with any tuberculous lesion. She loses flesh, gets steadily weaker, has night sweats, elevation of temperature in the evening, and increased rapidity of pulse. Menstruation may be in abeyance, but menorrhagia may in other cases be present. As a rule there is pain in the lower part of the abdomen and in the back. If there is a tuberculous



peritonitis the abdomen becomes swollen and tumid. Where there is an extensive cellulitic affection, the bowel may be compressed, resulting in pain and difficulty in defæcation. Bladder irritability is common.

The physical signs vary with the nature of the lesion. If there is a generalised tuberculous peritonitis the abdomen is swollen. In some cases this swelling is due to the matting of the bowel, in others to the presence of free fluid. In the former case the abdomen is tympanitic all over, whilst in the latter the characteristic signs of free fluid can be readily elicited. If a large cold abscess of the tube is present, a distinct cystic swelling can be felt rising above the brim of the pelvis. On vaginal and bimanual examination, the physical signs also vary. If the tubes are merely thickened and adherent, they can be felt on each side of the uterus. If the process has extended beyond the tubes into the broad ligaments, a densely hard mass filling up the pelvis is felt. If a pyosalpinx is present, a cystic swelling more or less fixed, and as a rule not very tender, is recognised bimanually at the side of the uterus.

In making the diagnosis the family history of the patient, the presence of tubercle elsewhere, or the general symptoms of tubercle must be carefully considered. Von Pirquet's tuberculin skin reaction may give some help. 'A positive' merely means that the patient has tubercle somewhere in her body and is no proof that the pelvic lesion is tuberculous. From a diagnostic point of view a negative reaction is of more value, as it definitely excludes the presence of tubercle anywhere in the patient.

#### TUBAL GESTATION.

Tubal pregnancy is a condition which seems at first sight to belong to obstetrics rather than gynecology, but in the early stages at any rate, owing to the serious complications calling for operative interference which are apt to supervene, it more frequently comes under the care of the gynecologist. It is from the operating table that the material has come which forms the pathological basis of our knowledge of extra-uterine gestation. This condition demands, more than any other, immediate diagnosis that it may be promptly dealt with. The post-mortem room, however, still furnishes specimens from cases which are obscure and run a rapid course. This is illustrated by the history of the case from which the preparation given in Plate V. was obtained. The patient was an unmarried woman, aged thirty, employed as a shop assistant. She had for some time been subject to gastric disorder for which she was from time to time treated by her medical attendant. On the night prior to her death he was called in on account of some slight abdominal pain and diarrhœa, and, seeing her again next morning, the symptoms suggested to him that she was suffering from a recurrence of her gastric trouble. He was informed that she had had a normal menstrual period two or



# TUBAL GESTATION.

Right side of the Uterus and right Fallopian tube viewed from the front. The gestation, of about three weeks' duration, is situated in the isthmus. In the centre of the swelling is the small point of rupture from which the patient bled to death.



three weeks previously. She became rapidly worse in the afternoon, and when seen by a surgeon in consultation early in the evening was so ill as to put operation out of the question. She died shortly afterwards, and, as the diagnosis was uncertain, a post-mortem was made. On opening the abdomen dark fluid blood welled out, and the abdominal viscera were bathed in blood, while in the pelvis were large clots. The blood and clots when removed filled a large wash-hand basin two-thirds full. The pelvic contents, when examined from above, showed at once the source of hæmorrhage. At the uterine end of the right Fallopian tube there was an almond-shaped swelling measuring a little over 1 cm. in its long axis, and in its centre a minute perforation from which blood oozed on gentle pressure. The condition was a ruptured tubal pregnancy.

In considering the pathology of tubal gestation we have to deal with (1) The causes leading to the development of the ovum in the tube; (2) the method by which the ovum engrafts itself there; (3) the changes in the tube and uterus; and (4) the progress and results of tubal pregnancy.

**Causes of Tubal Pregnancy.**—Although it has never been definitely proved in the case of the human subject, analogy from the lower animals makes it practically certain that the ovum is fertilised in most cases during its passage through the Fallopian tube and most probably towards its outer end. In ordinary circumstances such a fertilised ovum begins at once to segment and develop, and is carried through the tube into the uterus by the action of the ciliated epithelium. By the time it reaches the interior of the uterus, the ovum has acquired its penetrative power, and immediately buries itself in the substance of the area of mucous membrane with which it comes in contact, and in that situation it undergoes its further development. If for any reason, after it has acquired this penetrative power, the fertilised ovum is prevented from reaching the interior of the uterus, it may engraft itself in the tissue with which it comes in contact. This is most frequently the Fallopian tube. Any condition, therefore, which hinders the downward passage of the fertilised ovum through the tube may lead to a tubal pregnancy. A *diverticulum* of the lumen may lead to the arrest of the ovum. Such diverticula are, however, not so common as formerly supposed. Many of the cases described as pregnancy in a diverticulum have never been proved to be such, as serial sections of the tube were not made. A *previous inflammatory condition* of the tube is frequently a cause. This may act in two ways, either by destroying the surface epithelium and so doing away with the ciliary action, or by causing constriction of the lumen, leaving a passage sufficiently wide for the passing upward of the spermatozoa but too narrow for the descent of the much larger ovum. A history of a previous pelvic inflammation is frequently obtained in cases of tubal pregnancy. Excessive *length or tortuosity* of the tube, a persistence of

the foetal condition, have also been given as causes. The presence of a *small fibroid* constricting the lumen has also been described. In a considerable number of cases, however, there is no history of a previous salpingitis, and when the tube is examined after removal no cause for the arrest of the ovum can be discovered.

**The Engrafting of the Ovum in the Tube.**—The ovum engrafts itself in the tube-wall (fig. 139) in the same way as it does in the thickened mucous membrane of the uterus. At the time when this engrafting occurs the ovum is a small vesicle covered with epithelium, and it is this epithelial covering or trophoblast which has the penetrative power. It

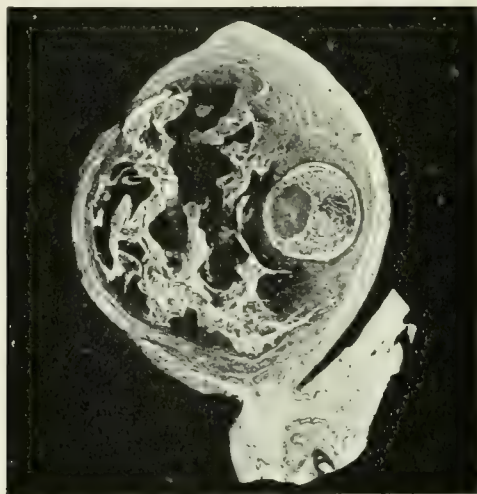


FIG. 139.—TUBAL PREGNANCY.

Transverse section of the tube at periphery of ovum which is growing in tube wall (from case figured in Plate V.). The lumen is intact, filled with catarrhal debris, and separated from the ovum bed by a layer of fibrin.

eats its way through the surface epithelium into the mucous membrane of the tube. This mucous membrane is very thin, so that the ovum soon penetrates beyond it into the muscular wall and in this situation it continues to develop. In the course of its growth the ovum sends out processes—the trophoblast—which penetrate deeply in all directions, eating into the walls of blood-vessels, causing blood-extravasation and destroying muscle-fibres. As it grows in size it produces a swelling of the tube-wall which bulges inwards towards the lumen. If a transverse section is made at this stage, the lumen of the tube will be found to be perfectly intact and the ovum will be seen lying in the substance of the tube-wall (fig. 139).



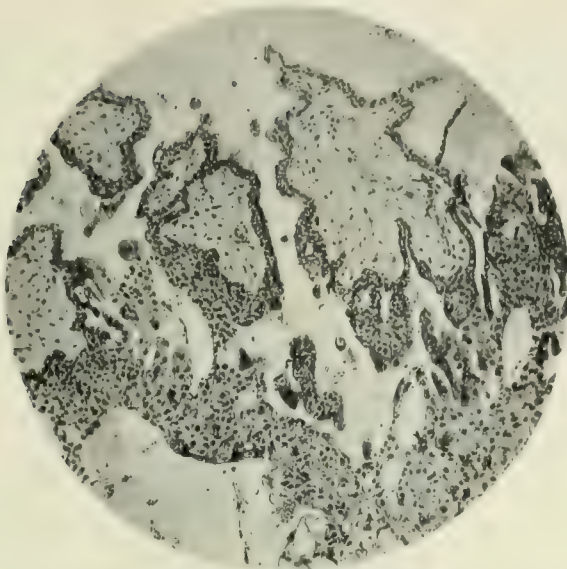


FIG. 140.—CHORIONIC VILLI FROM CASE OF TUBAL PREGNANCY (L.P.).  
Note the stroma of embryonic tissue and the covering of epithelium, Langhans' layer and syncytium.

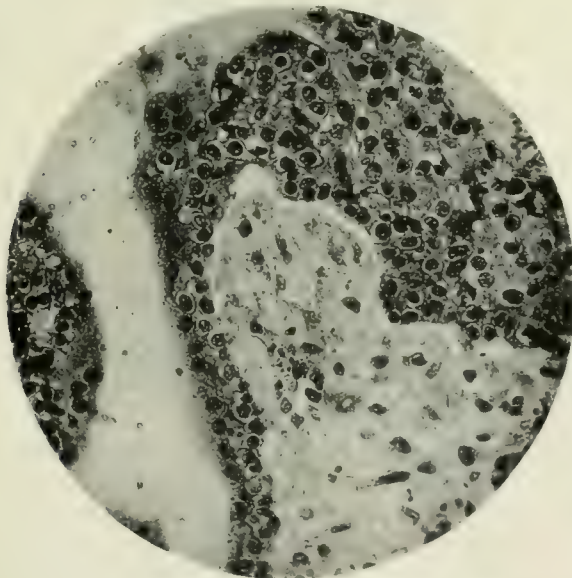


FIG. 141.—CHORIONIC VILLI FROM CASE OF TUBAL PREGNANCY (H.P.).

**Changes in the Tube and Uterus.**—In the mucous membrane and muscular wall of the tube there is a certain amount of reaction as the result of the presence of the ovum. The blood-vessels dilate, the endothelium lining them proliferates, and some of these endothelial cells may find their way outwards into the tissues of the part. The connective-tissue cells proliferate and enlarge and may take on an appearance very like that of true decidual cells. The relation of the chorionic villi to these cells is seen in figs. 140–141. These changes occur both in the mucosa and in the muscular wall. As a rule there is no true decidua formed in the tube; there is merely this attempt at its formation on the part of the endothelial and connective-tissue cells. In rare cases, such as the one described by Haultain, the mucous membrane becomes converted

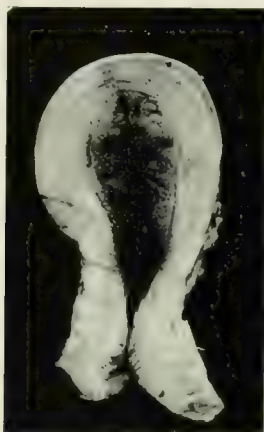


FIG. 142.—UTERUS FROM A CASE OF TUBAL PREGNANCY.

Note the thickness of the decidua.

into a true decidua. In his case there was also a decidua in the opposite tube. In the uterus a true decidua always forms. The mucous membrane there undergoes exactly the same changes as it would have undergone had the pregnancy been intra-uterine. The mucosa increases greatly in thickness (fig. 142) and the two layers, compact and spongy, can be recognised. The muscular wall also hypertrophies and the whole uterus becomes softened and enlarged.

**Progress and Results.**—The course of a tubal pregnancy depends partly upon the part of the tube in which the ovum has become imbedded. There are four possible sites—the fimbriated end, the ampulla, the isthmus, or the interstitial portion. Owing to the absence of decidual reaction on the part of the tube, the trophoblast of the ovum penetrates more rapidly and more deeply than in the case of an intra-uterine

pregnancy, and blood-extravasation is more abundant. The result is that very often the ovum dies and, surrounded by coagulated blood, becomes converted into a 'tubal mole'. The patient, from whom the tubal mole shown in fig. 143 was removed, gave the following history. A fortnight after a normal period she began to bleed from the vagina, which she attributed to a fall downstairs. There was no other symptom beyond this slight continuous hæmorrhage till a sudden attack of pain eight weeks later led her to seek advice. A dilated tube was recognised on the left side and abdominal section performed. There was no blood in the pelvis.

If this molar formation has occurred at an early stage, the whole mass

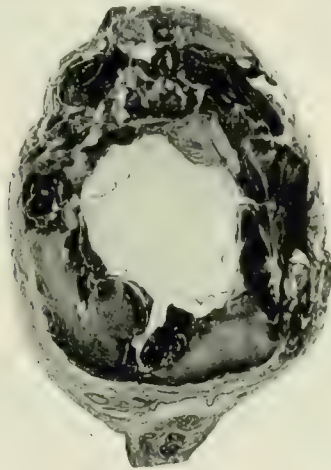


FIG. 143.—TUBAL MOLE.

The complete chorionic vesicle is seen in the centre and round it there is blood-clot. The tube is cut in transverse section.

may ultimately become completely absorbed. If the ovum continues to grow, it causes thinning of the tube-wall, and very soon leads to rupture. The rupture may occur into the lumen of the tube, into the peritoneal cavity (Plate V. and Plate VI. fig. 3), or into the cellular tissue of the broad ligament. If rupture occurs into the lumen, the ovum may escape into the interior of the tube and remain there as a tubal mole or be expelled through the fimbriated end, usually accompanied by a good deal of hæmorrhage—in some cases sufficient to cause the death of the patient. This is known as a 'tubal abortion' (Plate VI. fig. 2). This most frequently occurs when the ovum is situated towards the fimbriated end. When rupture occurs through the peritoneal aspect, a free intra-peritoneal hæmorrhage follows which may lead to the death of the patient within a

short time. This intra-peritoneal hæmorrhage occurs early and is very profuse when the pregnancy is in the region of the isthmus. The reason for this is that the isthmus is the part of the tube with the most unyielding walls and is also the most fixed part. It cannot, therefore, accommodate itself to the presence of the growing ovum. An enormous quantity of blood may be lost through a minute perforation in this region. In Plate V. such an isthmic pregnancy is shown of not more than three weeks' duration. The perforation was only the size of a pin-head (see fig. 145), and yet the patient bled to death within a few hours. The reason for this profuse hæmorrhage may be the power which



FIG. 144.—TUBAL PREGNANCY.

Transverse section of the tube, from Plate V. In the interior, note the chorionic villi. The wall of the tube is extremely thin and evidently on the point of rupture.

the trophoblast apparently possesses of preventing coagulation of the maternal blood.

Should the patient survive the rupture, the hæmorrhage round the ovum may be so great as to lead to its death and a tubal mole results, which may become completely absorbed or which may later become infected by the bacillus coli and be converted into an abscess. If the bleeding occurs slowly, either from a rupture or as the result of a tubal abortion, the blood may accumulate in the pouch of Douglas and there become encysted as the result of the formation of adhesions. To such an accumulation the term *pelvic hæmatocele* is given (see fig. 183). The term *pelvic hæmatoma* is applied to a collection of blood between the layers of the broad ligament, such as occurs in intra-ligamentary rupture.

Should the patient survive the rupture and the hæmorrhage not result



in the death of the ovum, the latter goes on growing. The chorionic villi, protruding through the peritoneal surface, acquire attachments to the structures in the neighbourhood, the back of the broad ligament, the uterus, the omentum, or intestines. In this case the ovum may go on growing till full time, or a secondary rupture with intra-peritoneal hæmorrhage may occur before then. Such a pregnancy is described as a 'secondary abdominal pregnancy'. If it goes on to full time the patient may have a 'spurious labour'; the fetus inside the abdomen dies and undergoes various changes. It may become calcified, and is then known as a *lithopædion*, which may lie in the abdomen indefinitely. It may become converted into adipocere, or the sac may undergo suppuration and

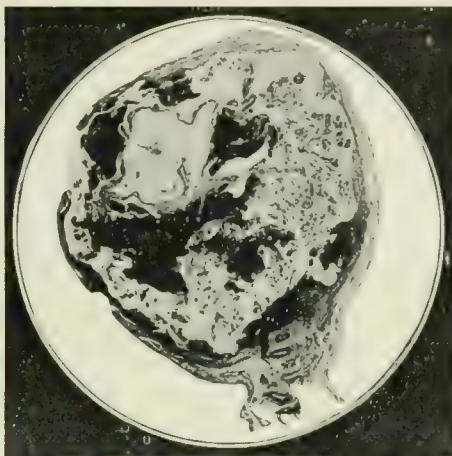


FIG. 145.—TUBAL PREGNANCY.

Section through same tube (Plate V.) at seat of rupture. From this minute rupture the patient bled to death. Note the chorionic vesicle and villi.

the bones of the fœtus be discharged through abdominal wall, bladder, or rectum. In the absence of treatment such a patient may die from the chronic suppuration.

If the rupture occurs on the under aspect of the tube, hæmorrhage occurs between the layers of the broad ligament. Such a hæmorrhage is never so profuse as an intra-peritoneal one, as the tension inside the ligaments prevents any great loss. A hæmorrhage of this kind, therefore, rarely in itself causes death. It may be sufficient, however, to cause the death of the ovum, and the result is again the formation of a mole. If the ovum goes on growing, the villi acquire attachments to the cellular tissue between the layers of the broad ligament, and the pregnancy is known as a 'secondary intra-ligamentary pregnancy'. After a time such



an intra-ligamentary pregnancy may undergo rupture through one or other aspect of the broad ligament and become secondarily abdominal, or it may go on to full time. The ovum first of all burrows downwards towards the base of the ligament, then lifts up the peritoneum on the front and side walls of the pelvis. At this stage it is known as a 'sub-peritoneo-pelvic gestation'. As it gets larger, the ovum finds its way upwards between the peritoneum and the anterior abdominal wall. It is then known as a 'sub-peritoneo-abdominal gestation'. At full time and after, the fœtus may undergo the same changes as those mentioned in connection with an intra-peritoneal pregnancy.

**Clinical Phenomena—Etiology.**—The etiology of the condition has been referred to in discussing the pathology. We have seen that in some cases the cause is apparently a previous tubal inflammation. In such there is often a history of a preceding labour or abortion followed by symptoms of pelvic inflammation and a long period of sterility, during which time the patient may have suffered from pre-menstrual dysmenorrhœa. Occasionally it occurs in a first pregnancy, as in the case of the preparation figured in Plate V.

**Symptoms.**—In tubal pregnancy, the symptoms vary considerably in the period of their onset and in severity according to the time and manner of rupture. During the first few weeks the symptoms as a rule are those of a normal pregnancy. The patient misses one or more periods, she experiences morning sickness, breast-changes occur, and she believes herself to be pregnant in the ordinary way. The first indication that the pregnancy is a tubal one may be the symptoms of internal hæmorrhage. She is suddenly seized with a severe pain in the lower abdomen accompanied by sickness and faintness. She becomes pale and is covered with a cold sweat; the pulse is rapid and feeble, and the temperature sub-normal. Such a sudden onset without previous warning is especially apt to occur when the pregnancy is in the isthmus. When the ovum is in the ampulla or infundibulum, minor disturbances as a rule occur before the actual rupture. The presence of the ovum in the tube sets up contractions of the muscular wall, and these produce intermittent pains in the lower part of the abdomen. As the ovum burrows into the wall some leakage of blood may occur into the lumen of the tube, and this may pass into the uterus and appear as a red vaginal discharge. Irregular hæmorrhage after a period of amenorrhœa is one of the commonest symptoms of tubal pregnancy. In a good many cases this intermittent hæmorrhage occurs from the beginning, without any period of amenorrhœa at all. The blood may come from the affected tube as indicated, but is usually a sign of the breaking-down of the decidual membrane which lines the uterus. Shreds of decidua may be detected in the discharge, or the decidua is cast off entire and expelled as a cast of the uterus. This is a rare occurrence, but is an important evidence that the pregnancy is extra-uterine (see



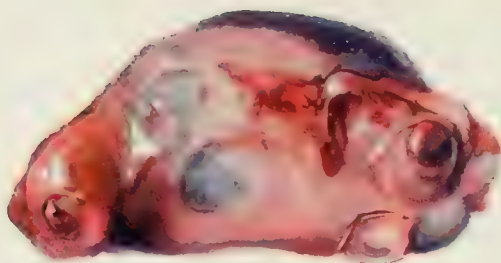


FIG. 1.

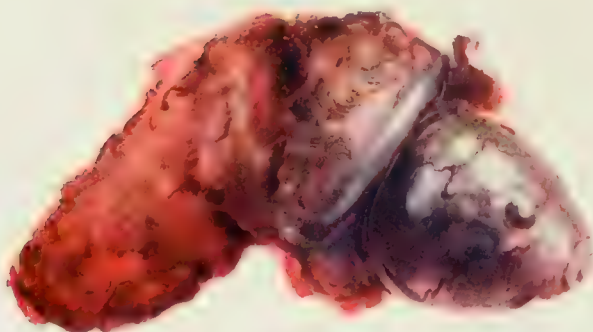


FIG. 2.

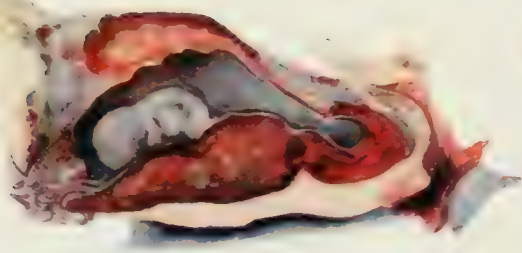


FIG. 3.



FIG. 4.

# TUBAL GESTATION.

- FIG. 1. Tubal gestation at sixth week - commencing tubal abortion.  
 FIG. 2. Tubal abortion at eighth week. To the left is the mole protruding from the fimbriated end of the tube.  
 FIG. 3. Tubal gestation ruptured at sixth week.  
 FIG. 4. Uterine cast expelled from same case - decolourised.

Plate VI.). When first passed it is of a reddish colour and may be mistaken for an early abortion; careful examination will show that it does not contain an ovum. When rupture occurs into the peritoneal cavity (Plates V. and VI.) there is a sudden onset of acute abdominal pain and collapse, the degree of collapse varying with the extent of the intra-peritoneal hæmorrhage. If rupture takes place into the lumen, the onset is not so acute and the symptoms of internal hæmorrhage not so pronounced; if the ovum is expelled (tubal abortion) into the peritoneal cavity, there may be as severe hæmorrhage as in intra-peritoneal rupture (Plate VI.). When the rupture occurs into the broad ligament, the effusion is limited by the peritoneum and the symptoms are correspondingly less acute. It is not always possible to distinguish these various forms of rupture clinically. It is only after the abdomen has been opened that we can definitely say what has occurred.

As the result of an intra-peritoneal rupture the patient may die of hæmorrhage within a few hours. If she survive, the symptoms may gradually pass off and, the ovum dying, she may make a complete recovery. If the ovum continues to grow, the acute symptoms may again come on as the result of a second rupture. In the absence of this, the gestation may go to full time with little further disturbance.

*Physical Signs and Diagnosis.*

Plate VI. shows the parts removed in cases of abdominal section for tubal abortion and ruptured tubal gestation. The tube in fig. 1 was removed from a patient æt. thirty-two who had one child thirteen years previously and no miscarriages. Four weeks before operation she was seized with abdominal pain, having passed her period by one week. An hour later there was some vaginal hæmorrhage which continued. After the first attack she had dull pain with occasional exacerbations and passage of clots. No faintness. A dilated tube was felt in the right fornix. On abdominal section only a small amount of blood was found in the pouch of Douglas, which was oozing from the fimbriated end of the tube. In fig. 2 the tubal abortion is more advanced. The mole is projecting as a reddish mass (to the left) through the dilated fimbriated end of the tube. This patient had four children, and a miscarriage. Three years later, after eight weeks' amenorrhœa, she had an attack like labour pains with vaginal hæmorrhage, and faintness. These symptoms continued for three weeks till she came to hospital, when a tense cystic tender swelling was felt beside the uterus with pulsation over it. On abdominal section there was a considerable amount of blood in the pelvis. Fig. 3 shows a tubal pregnancy which has ruptured; fig. 4, the decidual cast expelled from the same case. The tube is cut longitudinally; and, above the embryo, is seen the rupture. The patient had symptoms of intra-peritoneal hæmorrhage after amenorrhœa; and on opening the abdomen it was found full of blood, but the patient made a good recovery.

When the ovum has reached the age of five or six weeks, it produces in the tube a distinct swelling which can be palpated on bimanual examination. The detection of such a swelling to one side of the uterus, together with an increase in the size and in the softness of the uterus itself, ought always to make us suspect the possibility of a tubal pregnancy when there is a history of amenorrhœa followed by intermittent pain and hæmorrhage. It is, however, only rarely that we see the case at this stage. Usually the patient does not seek advice until symptoms due to rupture are present. If the rupture occurs very early, we have to rely for

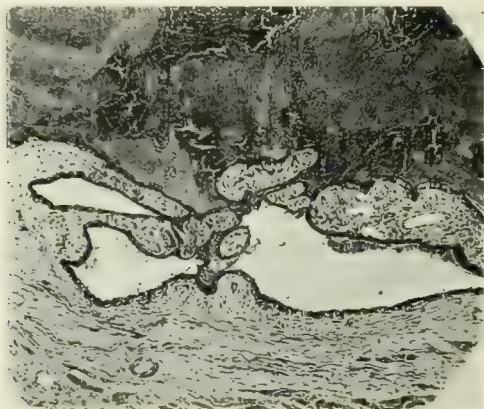


FIG. 146.—WALL AND CONTENTS OF A HEMATO-SALPINX.

The blood extravasation in the upper part is not due to tubal pregnancy. The folds of mucous membrane in the lower part look like chorionic villi, but more careful examination shows that they are mucosa.

our diagnosis on symptoms alone. The swelling in the tube may not be sufficiently large to be palpable. The presence of even a large quantity of blood in the abdomen is not always easy to detect. Blood does not show the same tendency as serous effusion to gravitate towards the flanks and lower part of the abdomen. It becomes clotted and entangled among the coils of intestine, and thus there is often no dulness in the flanks or above the pubes. On vaginal examination there may be a bulging in the pouch of Douglas, but if there are no adhesions this sign also may be absent. Such cases are diagnosed from the symptoms of internal hæmorrhage following amenorrhœa, the sudden onset, the collapse and pallor of the patient, the rapid and feeble pulse, together with abdominal tenderness and general tumidity, and usually a red vaginal discharge.

If rupture has occurred between the layers of the broad ligament, or if it has been intra-peritoneal and the blood has accumulated in the pouch of Douglas and become shut in by adhesions (*pelvic hæmatocele*), there



will be on vaginal examination a rounded, tense swelling in the posterior or lateral fornix. The examination of this swelling from day to day will give information as to the course which the pregnancy is taking. If the ovum dies, the mass will gradually get firmer and smaller and may ultimately entirely disappear. If the ovum continues to grow or fresh bleeding occurs, there is a return of the pain and the swelling becomes larger and more tense. If there is suppuration, there is rise of temperature, in some cases rigors, and the swelling may become bigger, more tense, and painful. Later, areas of softening may be detected. A blood-count will show an increasing leucocytosis.

When the gestation has gone on to the fourth month the case may be mistaken for a retroversion of the gravid uterus (see fig. 183) and towards full time may simulate normal pregnancy.

While *Hæmato-salpinx* is usually due to an extra-uterine gestation, there may be hæmorrhage into the tube *from other causes*. Fig. 146 is from such a case in which the results of microscopic examination confirmed the conclusion arrived at clinically, that tubal gestation was not the cause of the hæmato-salpinx.

#### TUMOURS OF THE FALLOPIAN TUBE.

Of the various forms of tumour of the tube, *e.g.* fibroid, dermoid, sarcoma, chorionepithelioma, perithelioma, we shall only mention carcinoma and papilloma.

1\* : We have met with *Carcinoma* only as secondary to cancer of the uterus, but it may occur primarily. Doran has collected 100 cases.

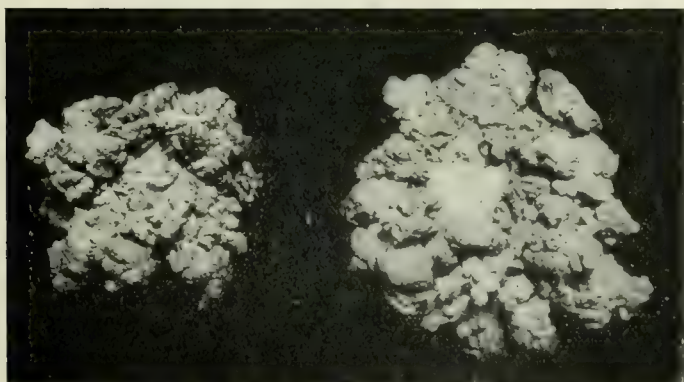


FIG. 147.—PAPILLOMATOUS TUMOUR OF TUBE.

2 : Pathologically a simple papillomatous tumour but clinically of doubtful nature.

Papilloma develops on the surface of the tube, more rarely as a cauliflower-growth from its mucosa, of which fig. 147 is an example. It shows the naked-eye appearance of the masses projecting from the ends

of the tubes, and fig. 148 their microscopic structure. The patient, aged 29, had given birth to four children, the last three years previously. Gradual distension of the abdomen of ten weeks' duration was the only complaint. This was found to be due to free fluid which made a bi-

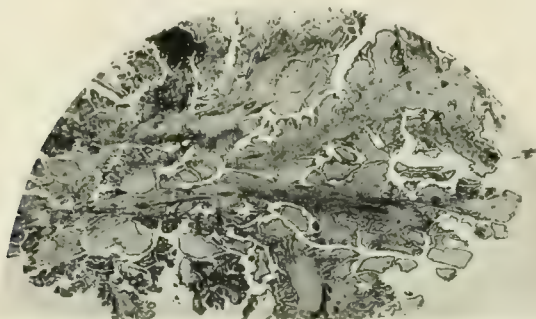


FIG. 148.—MICROSCOPIC SECTION OF PAPILLOMA OF TUBE IN FIG. 147, SHOWING BRANCHING CHARACTER OF GROWTH.

manual examination impossible. On abdominal section several pints of ascitic fluid were removed, and the peritoneum was found to be studded with secondary growths similar to the primary affection of the tube. A year after operation patient was well and without return of the ascites.

### AFFECTIONS OF THE OVARY.

**Anatomy and Physiology.**—The normal ovary has the form of an almond, measuring about an inch and a half in length, three-quarters of an inch in breadth, and half an inch in thickness. It has two surfaces, two borders, and two poles. It is attached by its anterior border or *hilum* to the back of the broad ligament (fig. 127; see also fig. 8). This attachment is peculiar in that the peritoneum of the posterior layer of the ligament stops short at the hilum, the surface of the ovary itself being covered not with peritoneum but with a layer of cubical cells known as the 'germ-epithelium' (fig. 149). The line of junction of those two round the hilum is called the 'white line'. The posterior border of the ovary is free. The inner pole is attached to the angle of the uterus, below and behind the insertion of the Fallopian tube, by the utero-ovarian ligament. The outer pole is swung out towards the side of the pelvis by the 'infundibulo-pelvic' or 'ovario-pelvic' ligament (fig. 127). In the normal position of the uterus, the ovary lies in a small depression of peritoneum known as the 'ovarian fossa' opposite to the sacro-iliac joint. There has been a great deal of controversy as

to the direction of the long axis of the ovary under normal conditions. This varies with the position of the uterus. The relations of the ovary have a bearing on the conditions found when the abdomen is opened and the broad ligament pulled up into view (fig. 8). The attachments, especially that through the ovario-pelvic and utero-ovarian ligaments, are of importance in relation to *prolapse of the ovary*. When these ligaments become relaxed, as in retroversion, the ovary tends to fall downwards and may be even below the uterus in the pouch of Douglas.

*Microscopic Structure.*—The ovary is composed in great part of connective tissue. At the hilum this is continuous, through the sheaths of the vessels which enter at this point, with the connective tissue between the layers of the broad ligaments. Round the periphery of the organ the connective tissue is condensed to form a fibrous tunic called the 'tunica albuginea'. On the surface of this is a single layer

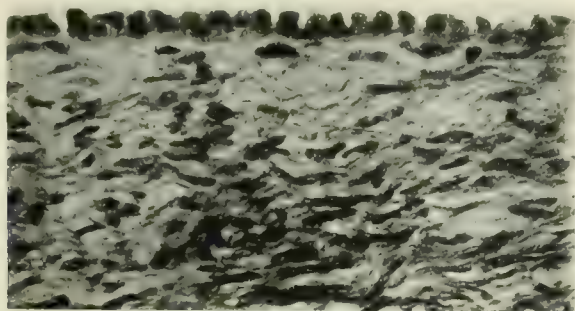


FIG. 149.—SURFACE OF OVARY.

Note the connective-tissue stroma forming the tunica albuginea. The covering is a single layer of cubical epithelium—the so-called germ epithelium.

of low, cubical epithelium known as the 'germ-epithelium' (fig. 149). This layer is the remains of the original epithelium from which the follicles develop. Underneath the tunica albuginea in the cortical zone of the ovary lie the ova, each enclosed in its Graafian follicle (fig. 150). The ripening of these will be described later.

*Physiology of the Ovary.*—It used to be supposed that the only function of the ovaries was to produce ova. While this is certainly their most important function it is not their only one. Removal of the ovaries results in certain general symptoms produced partly by the withdrawal from the system of some internal secretion for which the ovary is responsible.

The first thing noted, as a rule, after complete removal of the ovaries is cessation of menstruation. The ovaries, therefore, are the organs which determine menstruation, and they do so probably through an internal secretion. Ovulation and menstruation are not directly related.

After menstruation ceases other symptoms make their appearance, chiefly flushing, sweating, headache, giddiness, and a general feeling of nervousness. All those symptoms are due to vaso-motor disturbances and have led to the conclusion that the ovary produces an internal secretion which has an influence on the vaso-motor centres. Where this internal secretion is produced is not yet finally determined, but most of the evidence points to the corpus luteum.

In **Prolapse** the ovary, as the result of the relaxation of its ligaments (p. 151), is found at a lower level than normally or in the pouch of

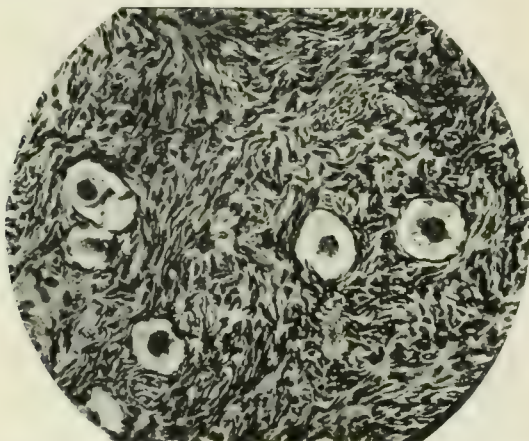


FIG. 150.—SURFACE OF OVARY, SHOWING PRIMITIVE FOLLICLES.

Each follicle consists of an ovum surrounded by a single layer of cells forming the zona granulosa and, outside this, connective tissue circularly arranged to form the tunica interna.

Douglas. In the latter case it is more easily recognised by recto-vaginal examination (see fig. 21).

#### Inflammation of Ovary: Ovaritis.

*Acute* inflammation occurs as part of inflammation of 'the uterine appendages'. The tube is usually the starting-point of the process, and the etiology and clinical phenomena are the same as have been described under acute salpingitis (see pp. 130-2). The ovary is recognised by its form and position, and is enlarged and tender on palpation.

*Chronic* inflammation results in the production of the 'cystic' and 'cirrhotic' ovary.

#### THE CYSTIC OVARY.

The cystic ovary is produced as the result of non-rupture of the Graafian follicles, and in order to understand its production it is necessary to consider the normal process of ripening and rupture of the follicle.



We have seen that in the cortex of the ovary the primitive follicles (fig. 150) are situated. Each primitive follicle consists of an ovum with its nucleus and nucleolus. Surrounding this is a single layer of cells, epithelial in type, known as the 'zona granulosa'. Round this the connective tissue of the stroma is arranged more or less circularly, and constitutes the 'theca interna' or 'tunica propria'. Beyond this is another connective-tissue layer, not so concentric in arrangement, called the 'tunica externa', which is really part of the general stroma of the ovary. At birth the great bulk of the ovary is made up of those primitive follicles. Between birth and puberty the connective tissue of the ovary increases greatly in amount, but no new follicles are formed.

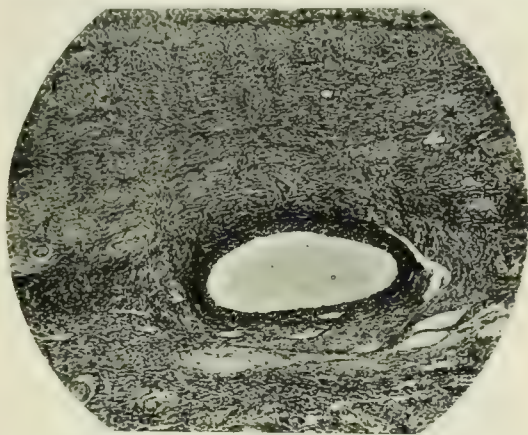


FIG. 151.—OVARY: RIPENING FOLLICLE.

The zona granulosa cells are in several layers and a space has appeared among them filled with fluid—the liquor folliculi. The ovum is not seen.

Between puberty and the menopause the follicles undergo the process known as 'ripening' or 'maturation', one follicle reaching maturity every month except during pregnancy and lactation.

*Ripening of the Follicle.*—The cells of the zona granulosa proliferate so as to form several layers (fig. 151), the tunica interna becomes more vascular and cellular, and the follicle tends to sink deeper into the substance of the ovary. A splitting takes place among the cells of the zona granulosa, and a space is formed which becomes filled with fluid known as the *liquor folliculi* (fig. 151). A special group of zona granulosa cells always surrounds the ovum and attaches it to the periphery of the follicle. This group of cells is called the 'discus proligerus' (figs. 152-3). The zona granulosa cells secrete more and more liquor folliculi so that the follicle increases in size and bulges towards the free surface of the ovary. The pressure against the tunica albuginea causes



it to give way, the wall of the follicle also gives way; and the ovum, surrounded by the discus proligerus, is extruded into the peritoneal cavity, from which it is taken up into the fimbriated end of the tube.

*Formation of the Corpus Luteum.*—The follicle, emptied of its fluid contents, immediately becomes filled with blood, which coagulates. The

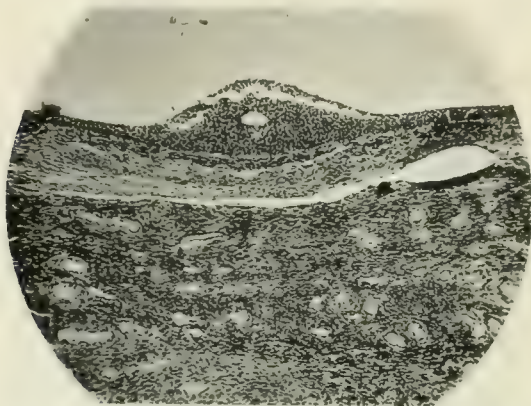


FIG. 152.—OVARY: RIPE FOLLICLE.

Note the ovum imbedded in the zona granulosa cells, which form at this point a projection known as the discus proligerus. The liquor folliculi is in the upper part of the section.

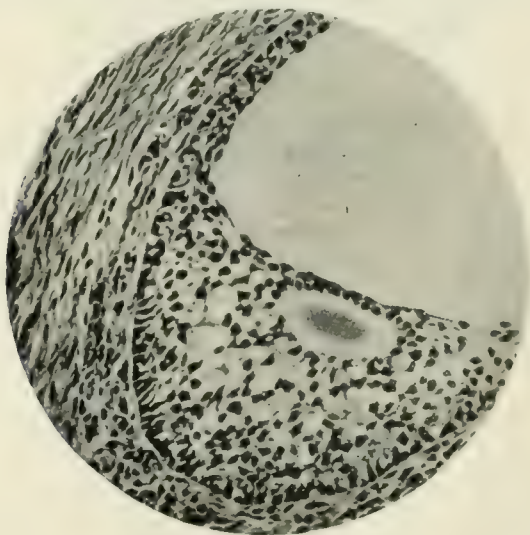


FIG. 153.—RIPE FOLLICLES (H.P.), SHOWING THE OVUM IN THE DISCUS PROLIGERUS.

rupture on the surface of the ovary also becomes closed over with blood. Previous to the rupture occurring, the connective-tissue cells of the tunica interna proliferate and enlarge, and granules of a yellow pigment 'lutein' appear within them. After rupture these lutein cells proliferate rapidly and form a dense layer round the blood-clot in the interior of

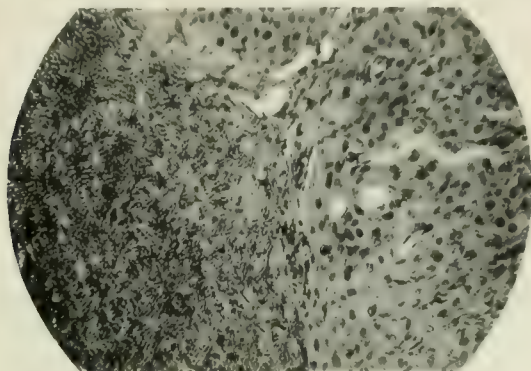


FIG. 154.—WALL OF CORPUS LUTEUM.

The lutein cells, large and closely aggregated, lie to the right. It is the pigment in these cells which gives the yellow colour.



FIG. 155.—OVARY: CORPUS ALBICANS, produced by hyaline degeneration of the fibrous tissue left after the disappearance of the corpus luteum.

the follicle. Any cells of the zona granulosa which have remained attached to the wall degenerate and disappear. The central blood-clot gradually shrinks, and in an irregular manner so that it acquires a crenated appearance. As the blood-clot shrinks, the area occupied by the lutein cells increases. At this stage these cells are closely packed together and present an appearance almost like epithelium (fig. 154).

They ultimately encroach on the central clot and almost completely destroy it. This process goes on for a period of four or five weeks. At the end of that time the lutein cells lose their proliferative power and begin to undergo degenerative changes. Capillary vessels extend among them from the tunica externa, and as the lutein cells degenerate their place is taken by young connective-tissue cells and ultimately the corpus luteum is converted into a small fibrous-tissue scar. In some cases this scar-tissue undergoes a hyaline change, and there is produced the body known as the 'corpus albicans' (fig. 155).

These changes occurring at regular intervals in the ovary are for the purpose, firstly, of enabling the ovum to reach the Fallopian tube where it may be fertilised, and secondly, of forming the corpus luteum, the cells of which produce an internal secretion which probably has an influence on general metabolism, and also a special influence on the engrafting of the fertilised ovum.

**Production of the Cystic Ovary.**—Under certain pathological conditions, rupture of the follicle may be prevented, and if these conditions persist over a length of time the distended and unruptured follicles form a series of small cysts towards the surface and in the substance of the ovary (fig. 156). Two factors may play a part in causing non-rupture

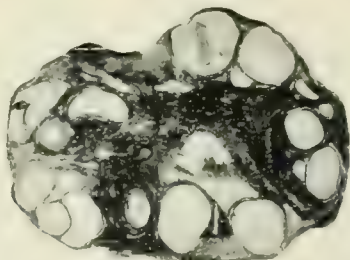


FIG. 156.—CYSTIC OVARY.

Section of ovary containing many cysts. Note how they are situated round the periphery. They are simple 'retention' cysts resulting from non-rupture of the Graafian follicles.

of the follicle. (1) If the tunica albuginea is abnormally dense it may be able to resist the pressure of the follicle (fig. 157). This abnormal density of the tunica albuginea is met with in cases of chronic ovaritis. The previous acute inflammation on the surface of the ovary results in a cicatricial thickening sufficient to prevent rupture. In other cases the tunica albuginea may be denser than normal, without any sign of previous inflammation being present. (2) In some cases it would appear that the follicle itself is at fault. The ripening process goes on apparently normally up to a certain stage and then ceases, and the ovum dies and disappears.

In some cases the formation of lutein cells in the tunica interna takes place, and the cysts are surrounded by a distinct lutein layer. Or a follicle may rupture normally and the corpus luteum remain cystic in the centre. In those two ways 'lutein cysts' may form.

The naked-eye characters of the cystic ovary are seen in Plate I., in which the ovary is shown in section. The tube is usually affected with chronic salpingitis, and is thus taken away along with the ovary in the

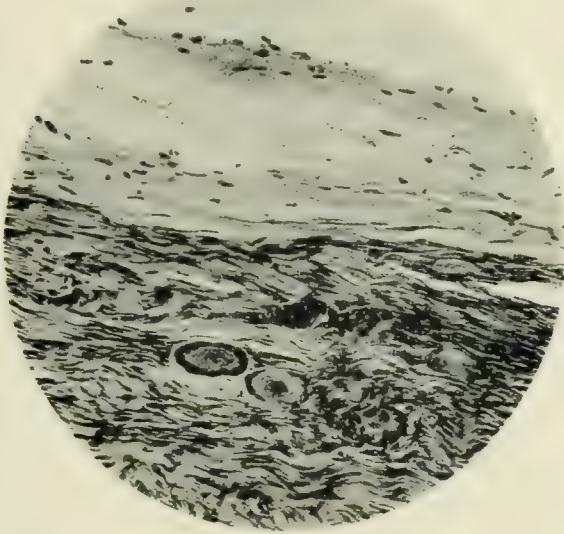


FIG. 157.—SURFACE OF CYSTIC OVARY.

In this case there was evidence of a previous inflammatory condition extending from the tube. Note the density of the tunica albuginea and the inflammatory deposit on the surface.

operation for 'removal of the uterine appendages'. The structures are represented life size and the natural colour reproduced as far as possible. It will be noted that the cysts vary considerably in size. The smaller ones are always situated immediately under the surface; the larger ones burrow more into the substance of the ovary. The contents of the cysts is a watery fluid, which coagulates with a formalin fixative (see Plate I. fig. 1). In fig. 2 the contents have fallen out and the cyst wall is seen. When examined with the microscope this wall is found to be lined by cells similar to those of the zona granulosa. They may be in one or more layers (fig. 158). In some the tension inside the cyst has flattened the cells against the wall. Surrounding a lutein cyst (Plate I. fig. 3) a yellow band is seen in which the characteristic lutein



cells are easily distinguished. Sometimes the cysts contain blood (Plate I. fig. 4).

It will thus be seen that the cysts present in a cystic ovary are *of the nature of retention cysts and are not new formations*. The cystic ovary must not be confounded with the cystic ovarian tumour, which is a new growth of the nature of an adenoma. It may attain a very large size, whilst the cystic ovary is seldom larger than a pigeon's egg. There is no tendency for a cystic ovary to develop into a cystic ovarian tumour.

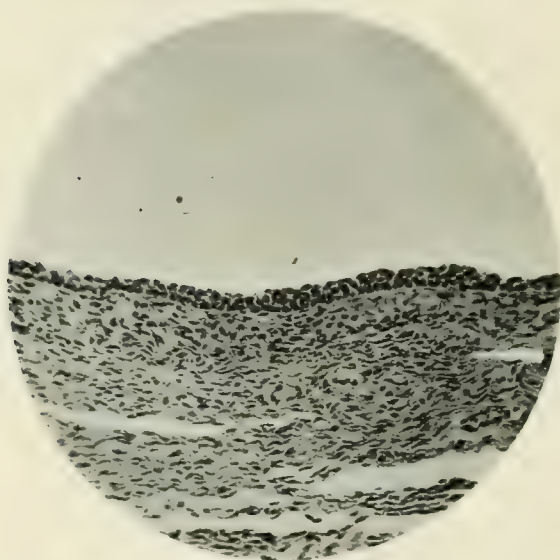


FIG. 158.—CYSTIC OVARY: WALL OF CYST.

The lining is exactly like that of the normal Graafian follicle. Contrast with lining of cyst in an ovarian tumour (fig. 160).

**Clinical Phenomena—Etiology.**—In some cases there is a definite history of a previous pelvic inflammation, usually tubal. In others no such history is obtained. It may be noted that in cases of uterine fibroids the ovaries are often cystic, and that the lutein cyst occurs with chorio-epithelioma.

**Symptoms.**—The mere presence of retention cysts in an ovary does not necessarily give rise to symptoms. Any symptoms present must rather be ascribed to the condition leading to the non-rupture of the follicles. If the cause of this be abnormal density of the tunica albuginea, symptoms are present the most characteristic of which is *pre-menstrual dysmenorrhœa*. For several days before the onset of menstruation there is an increased flow of blood to all the pelvic organs. Under normal circumstances the ovary is able to accommodate itself to



this congestion. If the tunica albuginea is cicatricial and dense, the extra congestion leads to an increased tension in the ovarian substance. This gives rise to pain which commences one or two days before menstruation, and may be relieved by the flow or continue during the first day and gradually subside as the pelvic congestion lessens. The severity varies considerably in different individuals, and it is often extremely difficult to estimate, as has already been referred to when discussing Dysmenorrhœa (see p. 6). The extent to which it interferes with the patient's work or social engagements is the best guide. Besides this distinct pre-menstrual pain, there is sometimes more or less constant pain present in the ovarian region. Frequently the patient suffers from *menorrhagia*, which is apparently due to simple congestion or to glandular hyperplasia of the endometrium. Sometimes there is *sterility*.

*Physical Signs.*—As a rule the cystic ovary is larger than normal and can be readily palpated on bimanual examination. When felt between the hands it is usually tender and may be movable or fixed. Its size bears no relation to the intensity of the Dysmenorrhœa. The small sclerotic ovary may give rise to more pain than the large cystic one. This fact adds greatly to the difficulty of determining whether an ovary ought to be removed or not. It is often found on opening the abdomen that on the side on which the patient complained of pain there is a small shrivelled ovary, whilst on the opposite side is a large cystic one. The mistake is frequently made of removing the latter, which seems to be the more pathological, with the result that the patient's pain continues and a subsequent operation for the removal of the other ovary has to be undertaken.

*Diagnosis.*—The diagnosis is based on the symptom of pre-menstrual dysmenorrhœa, the pain being situated in the front or sides of the abdomen, and the detection of an enlarged tender ovary on one or both sides. When the ovary is bound down by adhesions it may be difficult or impossible to ascertain whether it is enlarged. As to the *importance of the condition*, which has a bearing on operative treatment, more guidance will often be obtained from a careful consideration of the symptoms, including a study of the patient, than from physical examination. It must be borne in mind that removal of the ovary is here performed for the relief of symptoms, not for the cure of a disease which tends to shorten life.

#### THE CIRRHOTIC OVARY.

In some cases the ovary becomes more fibrous than normal and the tunica albuginea is thickened. This fibrous overgrowth may be the result of a previous inflammation or part of a general fibrosis occurring in all the pelvic organs. At the menopause it is a normal condition. We have seen that under certain circumstances thickening of the tunica albuginea

results in the production of a cystic ovary. In the class of case with which we are now dealing, the overgrowth of fibrous tissue in the substance of the ovary affects the nutrition of the follicles, with the result that they atrophy and many of them disappear. Those that remain fail to ripen, and so no cysts are produced. Such an ovary is usually smaller than normal; the surface is irregular and wrinkled and presents a dense white appearance. In some cases only part of the ovary may be so affected. It is not uncommon to see an ovary part of which is cystic and part typically cirrhotic.

On microscopic examination of such ovaries, the density of the tunica albuginea and of the general fibrous stroma is at once apparent. Corpora albicantia are numerous in the outer zone, and follicles are few in number. In the medulla the vessel walls are thickened, especially the outer coat.

**Clinical Phenomena—*Etiology*.**—There may be a history of previous pelvic inflammation but in many cases this is absent. The condition is met with both in multiparous and in nulliparous women. Sometimes it is associated with a fibrosis of the uterus.

***Symptoms*.**—The prominent symptom is, as in the Cystic Ovary, *pre-menstrual dysmenorrhœa*. The thickening of the capsule and the general density of the ovary lead to a greatly increased tension when pre-menstrual congestion of the pelvis occurs, and this leads to pain. The pain may begin three or four days before the period and, while slightly relieved after the flow commences, may persist to a certain extent throughout the period. It may be so severe as to totally incapacitate the patient at these times. Menorrhagia is another symptom which may be present, due to some reflex action on the uterus or to an associated uterine fibrosis.

***Physical Signs*.**—Considering the severity of the symptoms, the physical signs are insignificant. On abdominal examination some hyperæsthesia and tenderness may be detected over the ovarian region. On bimanual examination the ovary is felt to be of normal size or smaller than usual, and may be exceedingly tender. It is movable or fixed according as it is free from adhesions or not. If there is associated uterine sclerosis, the characteristic hardness of the uterus may be detected.

***Diagnosis*** is made from the pre-menstrual dysmenorrhœa and the small size and tenderness of the ovary. On abdominal section the wrinkled, dense, white appearance of the ovary is diagnostic. When permission has been obtained for the removal of only one ovary and it is found that one is cystic and the other cirrhotic, the cirrhotic one should be removed and the cystic one left, because as a rule a cirrhotic ovary gives rise to more pain than a cystic one.

**THE MULTILOCULAR OVARIAN CYST.**

This is the commonest form of Ovarian Tumour. It is so named because it is composed of a series of cysts, giving to the tumour when seen in section a multilocular appearance. Pathologically it is of the nature of a simple adenoma, hence the term 'compound cystic adenoma' applied to it. It arises in the substance of the ovary and therefore has the same attachments. When the tumour grows to a large size, these attachments become stretched, and are known as the 'pedicle'. This

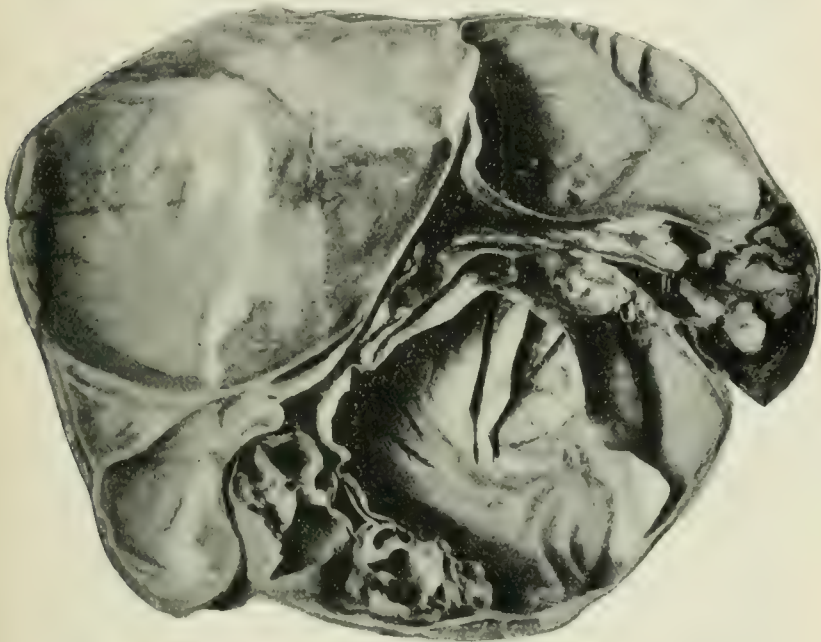


FIG. 159.—COMPOUND CYSTIC OVARIAN TUMOUR.

Note the multilocular character. The partitions between the cysts are composed of connective tissue and they are covered with a single layer of tall columnar epithelium.

consists of the upper part of the broad ligament, including the uterine end of the tube, the utero-ovarian ligament and the ovario-pelvic ligament. Through the pedicle the tumour derives its blood-supply from the ovarian artery in the ovario-pelvic ligament, and the terminal branches of the uterine artery where they join the ovarian at the upper angle of the uterus. Sometimes no pedicle forms but the tumour grows downwards into the broad ligament, becoming a 'sessile cyst'.

The tumour may be small, situated entirely within the pelvis, or may attain such a size as to completely fill the abdominal cavity. The

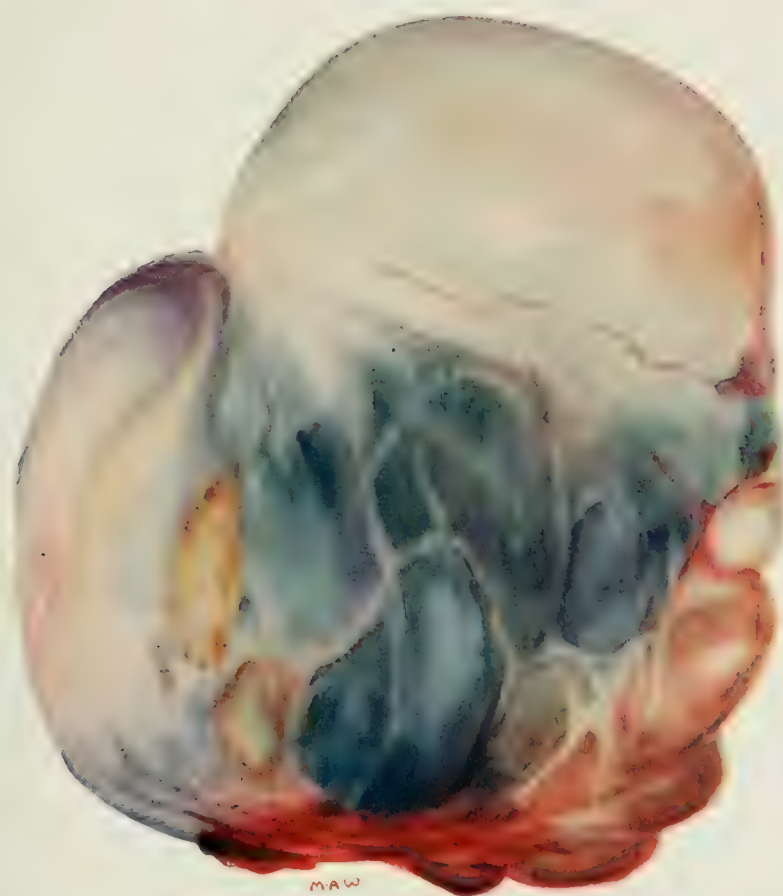
outer surface is usually irregularly bossed owing to the irregularity in the size of the loculi. It is smooth and glistening in appearance and usually of a bluish colour. Its colour varies with the content of the cyst, as is well seen in Plate VII., in which the natural colour of this tumour immediately after removal is shown. As the ovary is not covered by peritoneum but by a layer of cubical cells known as the germ-epithelium, there is no peritoneum on the surface. This layer of cells can be detected on the surface of an ovarian tumour, except in those of large size, where it disappears. On making a section through the tumour, it is seen to be composed of a series of loculi varying in size and separated from each other by thin partitions (fig. 159). The septa in the walls of the larger cavities show that these are produced by the fusion of smaller loculi. Often there is one large cavity in the upper abdominal part of the tumour, while the lower part of the tumour appears sponge-like on section. Or there may be more solid parts in the wall of a large cyst which cause inequalities on its surface.

The contents of the loculi vary in consistence, being viscid in the smaller, but more watery in the larger cavities. The colour is like white of egg in the small cysts, but may be dark green or brown in the larger ones through the breaking down of the septa. In cases where much hæmorrhage has occurred into the cavity the contents may be almost black. The specific gravity of the fluid varies from 1010 to 1030. It consists chiefly of a substance resembling mucin, except that it is not soluble in acetic acid; hence it has been called 'pseudomucin'. On boiling with acids, a carbo-hydrate is separated.

On microscopic examination the adenomatous nature of the tumour is evident. Each loculus is composed of a connective-tissue wall lined by a single layer of very tall columnar epithelium (fig. 160). The epithelial cells are arranged in palisade form. Each cell has a deeply staining nucleus situated towards the base; the free end of the cell is expanded and distended with pseudomucin, which is discharged into the loculus. These cells usually form a smooth lining to the cyst; sometimes there are papillomatous projections into the interior. The outer wall of the tumour is composed of connective tissue, on the surface of which is the covering of germ epithelium.

The mode of origin of these ovarian tumours is not settled. It was at one time thought that the adenomatous part was derived from the epithelium of the Graafian follicles. A comparison between the cells of the zona granulosa and the cells lining an ovarian cyst renders this unlikely. The zona granulosa cells are small and cubical, the cells of an ovarian cyst tall and columnar. They are in fact mucous cells. There are in the normal ovary no structures which could give rise to such tumours, and we must suppose that they take origin in some epithelial 'rests' in the substance of the ovary. Such included epithelium can be





MULTILOCULAR OVARIAN CYST—'OVARIAN TUMOUR'.





demonstrated. We have found in sections of a slightly enlarged ovary, tubules lined with columnar epithelium in the substance of the connective tissue. Whatever be the origin, an ovarian tumour grows fairly rapidly, the loculi increasing in size through the coalescence of smaller ones and the active growth of their epithelial lining.



FIG. 160.—COMPOUND CYSTIC OVARIAN TUMOUR.

High-power view showing character of lining of cysts. The epithelial cells are very tall and the nuclei are at the bases of the cells. They secrete the tenacious contents of the cysts.

#### THE PAPILLOMATOUS OVARIAN CYST.

This is a cystic tumour, sometimes unilocular, more often multilocular, growing from the ovary. From the inner wall papillomatous growths project into the interior. They usually spring from the hilum of the ovary, where they are supposed to originate in Wolffian remains. They are frequently bilateral and the majority of them are malignant in nature. In some cases the papillomatous growths break through and project from the free surface of the cyst. The epithelium from such projections may become implanted on surrounding abdominal organs, causing secondary deposits in the peritoneal cavity. Such extension is associated with the presence of free fluid in the abdomen.

The contents of these cysts are always more watery than that of the compound cystic adenoma and frequently blood-stained. It is not always possible to tell before opening the tumour whether it is a simple cyst adenoma or a papilloma. This forms an argument in favour of the

removal of all ovarian tumours entire, as the escape of any of the papillomatous tissue into the peritoneal cavity at the time of operation might result in the formation of implantation growths.

Microscopic examination shows these tumours to be adenomatous in character. The cyst-spaces are lined by a tall columnar epithelium, usually in a single layer. The papillomatous projections are composed of a core of connective tissue covered with the same type of epithelium.

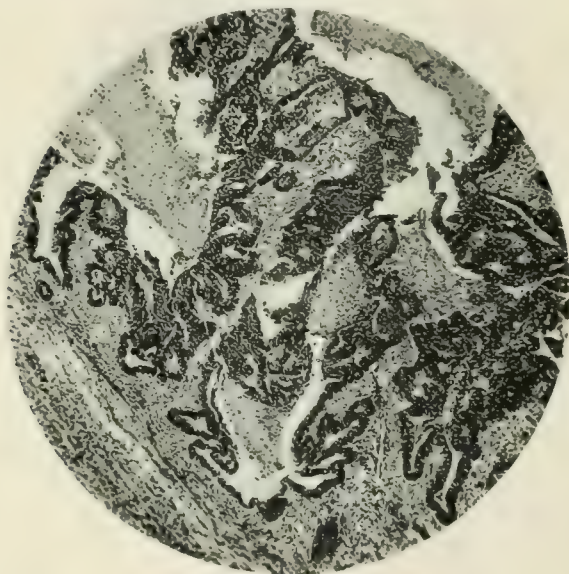


FIG. 161.—PAPILLOMATOUS OVARIAN CYST.

A malignant tumour. Note the many-layered character of the epithelium and its penetration into the stroma.

It may be in a single layer, or in the malignant cases in several layers. In the simple tumours the epithelium shows no tendency to invade the connective-tissue stroma; while in the malignant ones, it eats its way in in the form of solid plugs and, as has been mentioned, may come to project through the free surface of the tumour. The tumour of which a section is given in fig. 161 was removed from a patient aged fifty-five. It was of the size of a cocoanut and had a twisted pedicle. The walls were friable and showed papillary growths on the surface. There was a considerable amount of ascites but no infiltration of the peritoneum.

#### THE DERMOID OVARIAN CYST.

Dermoid cysts constitute from 3 to 4 per cent. of all ovarian tumours. They are mono- or poly-cystic and a great variety of tissues



DERMOID TUMOUR OF OVARY.

Laid open with sebaceous material removed to show hair, skin, bony plates and teeth.





may enter into their composition. They are unilateral or bilateral, are of slow growth, and seldom attain a size larger than the foetal head. They frequently lie in the pouch of Douglas behind the uterus and are specially liable to torsion of the pedicle, suppuration and malignant change. The simplest form of tumour is composed of a single cyst lined with skin structure made up of a stratified squamous epithelium with a Malpighian layer, beneath which is connective and fatty tissue (see Plate VIII.). Hair follicles are present in it, together with sebaceous and sweat glands (fig. 162). The hair may be of some length, hanging free or

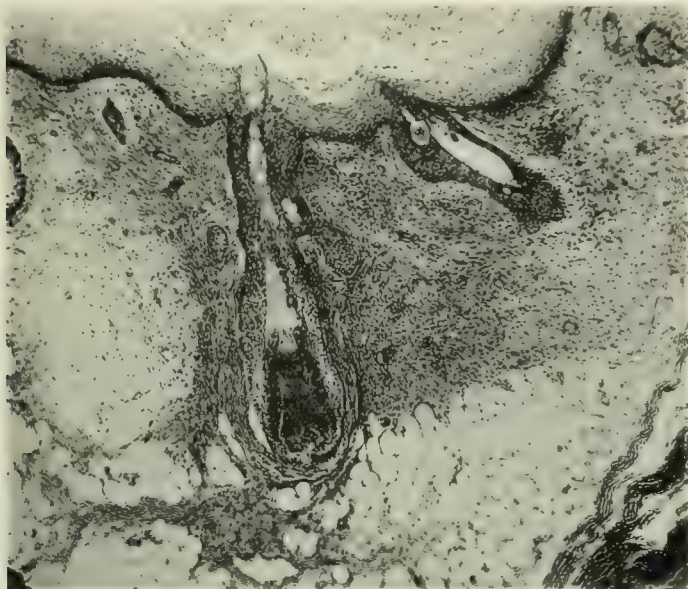


FIG. 162.—DERMOID TUMOUR OF THE OVARY.

A section of the lining of the cyst, showing the covering of stratified squamous epithelium, hair follicles, sebaceous glands, and fat cells.

detached in balls. The contents of the cyst are sebaceous material secreted by the sebaceous glands, mixed with desquamated epithelium and hair. This sebaceous material at the body temperature is fluid, but when the cyst is removed from the body it coagulates, forming a substance of the consistence of lard. In some dermoid tumours other tissues may be found. Teeth are frequently met with, sometimes growing free in the soft parts (Plate VIII.), sometimes imbedded in bone. Muscle, mammary and thyroid gland substance, cartilage, intestine, may all be present in the wall of such cysts. Usually when such a variety of structure is present the tumour is solid and is known as a *teratoma*.

The origin of those tumours has given rise to much speculation. The most likely theory is that they arise by a process of parthenogenesis; that is, that they develop from an unfertilised primordial ovum.

#### SOLID OVARIAN TUMOURS.

**Fibroma.**—This rare tumour arises from the connective-tissue stroma of the ovary. It is unilateral or bilateral and varies in size from a pea to a foetal head. It arises as a localised nodule springing from one pole or surface of the ovary, or has a more diffuse origin so that it expands the ovary equally in all directions, leaving only a thin shell of ovarian substance on the surface. Such a tumour usually retains the shape of the ovary, and the surface has a lobulated or convoluted appearance

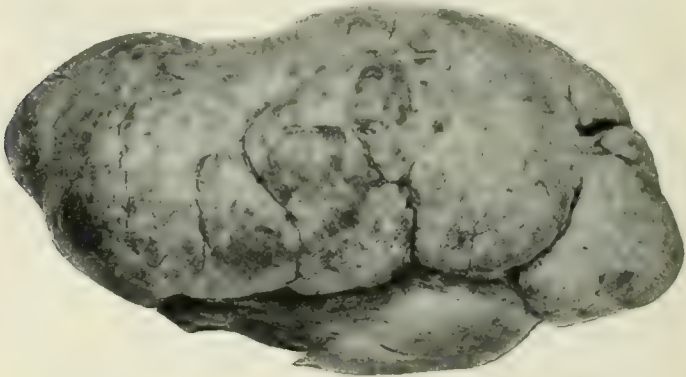


FIG. 163.—FIBROMA OF THE OVARY.

Note the irregularly lobulated character of the surface. The ovarian tissue is below.

(fig. 163). There is a distinct pedicle. On section the tumour is hard and non-vascular. Microscopically, it is composed for the most part of fibrous tissue with a small quantity of non-striped muscle. A fibroma sometimes springs from the utero-ovarian ligament, and usually contains a small amount of non-striped muscle fibre. Ovarian fibroids frequently undergo torsion of the pedicle and then give rise to ascites. They may undergo various forms of degeneration, especially mucoid and myxomatous.

**Sarcoma.**—This usually forms a solid tumour which, however, is of soft consistence. To the naked eye such tumours have much the same appearance as fibroma but are of more rapid growth, are always associated with ascites, and may arise at quite an early age. They may be of the round-celled, mixed-celled or spindle-celled variety.

Under this head we also include *Endothelioma*, a comparatively rare form of malignant tumour which arises from the endothelium of the blood-

vessels or lymphatics. Fig. 164 shows the naked-eye appearance of the bilateral tumours removed by abdominal section from a patient aged forty-two. There was a history of two years' growth, and their consistence suggested a fibroid. There was some ascites and the abdominal section



FIG. 164.—ENDOTHELIOMA OF BOTH OVARIES, REMOVED BY ABDOMINAL SECTION.

The tumours reached to the umbilicus and were of firm consistence.

Note their nodular surface.

showed secondary affection of the peritoneum. Fig. 165 shows the microscopic appearance.

**Carcinoma.**—A carcinomatous tumour of the ovary (fig. 166) assumes different forms. Frequently it is a solid tumour, with a naked-eye appearance very like fibroma. Such tumours are often bilateral and many of them are really secondary in nature, the primary disease being in the mammary gland or in some part of the alimentary tract or liver. Whether the disease is carried to the ovary by the lymphatics or whether it is of the nature of an implantation is not always quite clear. When-



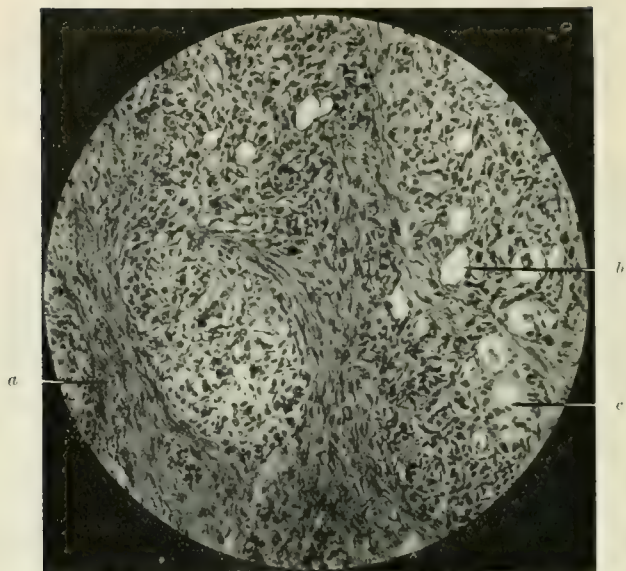


FIG. 165.—MICROSCOPIC SECTION OF ENDOTHELIOMA OF OVARY.

- a.* Remains of ovarian stroma pushed aside so as to produce alveoli; *b.* Lymphatic with normal endothelium; *c.* Endothelium becoming columnar—the greater part of the section consists of cells derived from this source.

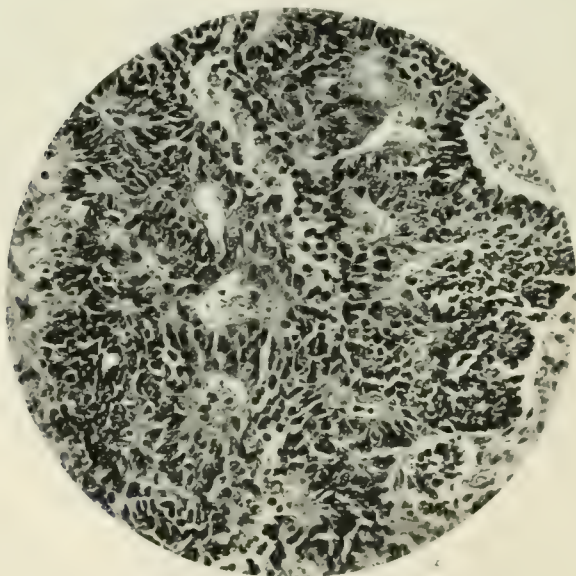


FIG. 166.—MALIGNANT OVARIAN TUMOUR.

This is a carcinoma. Note the dense masses of epithelial cells.

ever such bilateral, solid, malignant ovarian tumours are met with, search should always be made for a primary focus.

An ordinary cyst adenoma may undergo *carcinomatous degeneration*, especially in later life. When this occurs, the epithelium lining the cysts invades the stroma and may protrude from the free surface in the form of papillomatous outgrowths. The papillomatous ovarian cyst is frequently malignant to begin with and, if not, has a tendency towards the development of malignancy.

### Clinical Phenomena of Ovarian Tumours.

The clinical manifestations of ovarian tumours vary with the *nature* and the *size* of the growth. This fact determines the method of considering them. The Multilocular Ovarian Cyst alone calls for detailed consideration; the other forms can be dealt with more briefly.

**The Multilocular Ovarian Cyst.**—An 'ovarian tumour' presents a striking contrast to the other two frequent types of pelvic neoplasm in the female, namely, Uterine Fibroids and Cancer. Age does not seem to influence its development. Our Infirmary statistics of Ovariectomy show that 2·4 per cent. of the patients were under 20, 24·6 between 20 and 30, 21·4 between 30 and 40, 19·8 between 40 and 50, 19·8 between 50 and 60, and 11·9 over 60 years of age. While there were very few cases under 20, the greatest number were between 20 and 30, after which the figures show a gradual diminution. There is not the same marked influence of age as is shown in the tables for Fibroid Tumours and Cancer. Nor are the functions of menstruation or reproduction affected. There is neither amenorrhœa nor menorrhagia, and the fertility of the married patients in the same series of cases shows a mean of four or an average of five children to each marriage.

In its earliest development an ovarian tumour is without symptoms. As a rule the patient does not know that she has an ovarian tumour until it rises out of the pelvis and her attention is drawn to its presence by the swelling of the abdomen. The rate of growth varies in different cases. Contrasting it with two other common types of abdominal enlargement, its growth is more rapid than that of the uterine fibroid, less rapid than that of the pregnant uterus. With the exception of the rare cases in which a tumour is impacted in the pelvis, or torsion of the pedicle occurs, symptoms do not arise till late and are chiefly due to the size of the tumour, the inconvenience of the abdominal distension, pain from localised peritonitis, dyspœa and palpitation when the action of the diaphragm is interfered with, and finally cachexia from the drain on the system.

**Diagnosis.**—We consider this under the headings of physical signs and differential diagnosis. While an ovarian tumour may be the easiest



pathological condition to recognise, it may be the most difficult. It is especially in connection with the diagnosis of an ovarian tumour that *differential diagnosis* is called for, i.e. the 'difference' between an ovarian tumour and other gynecological conditions found in the pelvis and abdomen already described, as well as other pathological conditions which do not belong to Gynecology.

1. *Physical Signs of a Small Intra-pelvic Tumour.*—These are evident only on vaginal or bimanual examination. There is nothing to draw the patient's attention to the tumour, and a small ovarian cyst is usually discovered accidentally when examination is made for some other reason.

A round, smooth, non-sensitive, tense cystic swelling is recognised to one side of the uterus, with displacement of the latter to the other side of the pelvis or to the front, if the tumour be in the pouch of Douglas. On pushing the tumour aside so as to get the uterus between the hands it is found not enlarged and capable of being moved independently of the tumour. Sometimes the fingers can be got between the tumour and uterus, showing that there is a pedicle; if sessile the uterus is separated from the tumour only by a groove. To determine the exact connection between them the uterus may be drawn down with a volsella to make the connection tense, examination being made at the same time with the index-finger *per rectum*.

2. *Physical Signs of an Abdominal Ovarian Tumour.*—When the cyst has become abdominal in position the physical signs are best described according to the method of ascertaining them.

On *inspection* the abdomen is enlarged, the enlargement being more to one side if the tumour be just rising above the brim, but central when it fills the abdominal cavity. The distension is in the middle line, not at the sides as in ascites. The fact that the fluid is encysted and not free may be elicited by making the patient sit up, when the contour of the tumour is brought out beneath the contracting recti. Another peculiarity of contour which contrasts with enlargement due to a fibroid is noted when looking at the abdomen from the side. The abdominal wall slopes towards the thorax instead of dropping suddenly as it does over the more solid fibroid (figs. 1 and 2).

On *palpation* a rounded or uneven mass is felt—uneven if the tumour be lobulated, which is less common. On superficial palpation the surface is found to be uniform, though sometimes a localised bulging is felt. Laying both hands over the tumour with the finger-tips pressed down into the pelvis, it is found to extend downwards into the latter and to be elastic and tense, having neither the board-like firmness of a fibroid nor the yielding softness of the pregnant uterus. Fluctuation is felt through different parts of the tumour,—most distinct where there is one large cavity, less evident where there are several small ones.

*Percussion* shows dullness in the middle line over the tumour with a

tympanitic note in the flanks, the reverse of what obtains in ascites. The area of dulness does not change with change of posture.

*Auscultation* reveals nothing except in the rare cases where friction is heard from localised peritonitis.

*Vaginal examination* gives no additional information. The cervix is of normal consistence and the body of the uterus is usually pushed down by the tumour. Sometimes when the tumour has grown between the layers of the broad ligament the uterus is pushed upwards; in these cases a pedicle has not formed, the tumour being sessile.

*Rectal examination* defines the position of the uterus when the latter is retroverted by the tumour.

**Differential Diagnosis.**—The diagnosis of an ovarian tumour from other pathological conditions opens up a wide field of inquiry, so wide that it covers not only the whole of gynecology but also obstetrics and the pathology of other abdominal organs. It is convenient to group pathological conditions round normal structures, and to separate the differential diagnosis of small tumours within the pelvis from that of large tumours occupying the abdomen.

#### (a) *Differential Diagnosis of Small Pelvic Tumours.*

In the pelvis conditions simulating an ovarian tumour arise in connection with the uterus, the tube, the peritoneum and cellular tissue, and also with the bladder and rectum.

Taking the *bladder* and *rectum* first, these organs must always be emptied by catheter and enema in doubtful cases. The distended bladder has frequently been mistaken for a cystic tumour through this rule not having been observed. It is always more satisfactory to examine the patient in bed, instructions having been given that a dose of opening medicine be taken the night before, followed if necessary by an enema in the morning. If from any cause the bimanual is difficult, it is well to give the patient an anæsthetic.

Of *uterine conditions* there are these two—pregnancy and a fibroid tumour.

In *pregnancy* there are the signs and symptoms of early pregnancy, and the uterus is not felt beside the swelling which is the distended uterus. In doubtful cases certainty is only arrived at by asking the patient to report herself again in four weeks, the pregnant uterus changing its character more rapidly than any tumour. Normal pregnancy should not give rise to difficulty, but a retroflexed gravid uterus has occasionally been mistaken for an ovarian tumour. The early symptoms of pregnancy have not been recognised, the cervix is supposed to represent the uterus and the enlarged soft fundus to be an ovarian tumour occupying the pouch of Douglas. Such a mistake is more likely to be made when the retroverted uterus has become tender, making examination difficult.

A uterine *fibroid* is firmer than an ovarian cyst, causes menorrhagia, and does not grow rapidly. Soft sub-peritoneal fibroids may so closely resemble an ovarian tumour that certainty in diagnosis is only possible on abdominal section.

As to the *uterine appendages*, a Fallopian tube may be distended in cases of tubal gestation and of hydro- or pyo-salpinx. In the former case there are symptoms of pregnancy and then of rupture. An ovarian tumour is thus not likely to be mistaken for a tubal pregnancy unless its pedicle has been twisted, when it may suddenly produce symptoms—this, however, is rare in the case of small tumours. A hydro- or pyo-salpinx has the symptoms of inflammation following on exposure to septic or gonorrhoeal infection; the tumour is elongated like a sausage or retort and springs from the side of the fundus.

As to the *peritoneum* or *cellular tissue*, ordinary peritonitis does not resemble an ovarian tumour; but where the effusion has become encysted, so-called serous peritonitis, the resemblance is so close that diagnosis is only possible after watching the case for some days. A serous effusion will undergo changes while an ovarian tumour does not. A cellulitis resembles an ovarian tumour only when it is suppurating. In a pelvic abscess there are general symptoms, pulse and temperature.

#### (b) *Differential Diagnosis of a Large Abdominal Tumour.*

Abdominal *fulness due to fat* is easily recognised but may render exclusion of other pathological conditions difficult, owing to its interference with palpation and impairing percussion.

*Distension due to flatus* gives a tympanitic note; but to be certain that a tumour is not present as well, the bowels must be thoroughly moved before an opinion is given, and sometimes an anæsthetic is necessary.

Distension of the peritoneal cavity by *free fluid* gives a note dull in the flanks and tympanitic in the centre, the opposite of what obtains in the case of an ovarian cyst. The area of dullness also changes on change of posture, while that of an ovarian does not. *Encysted fluid* will, however, closely resemble an ovarian cyst. The history and other physical signs may help, pointing to a serous peritonitis or a tuberculous peritonitis. Cases of tuberculous peritonitis present the greatest difficulty, and frequently diagnosis is only made on abdominal section. Malignant peritonitis, which also presents great difficulty, is often secondary to a malignant ovarian tumour.

Passing to conditions of the various organs and taking first the pelvic organs, we note that the catheter should always be passed to prevent mistaking a *distended bladder* for a tumour. The statement that the patient has just passed water should never be trusted when a cystic tumour occupies the position of the bladder.

As to the *uterus*, we note that *normal pregnancy* is easily distinguished by the consistence of the uterus, its intermittent contractions, the feeling of foetal parts and the presence of the foetal heart and uterine souffle. Should the pregnancy, however, be *abnormal* and the foetus be dead or it be a case of hydramnios, diagnosis may be difficult. In hydramnios the uterus is more tense, the foetus may be felt with difficulty and its heart not heard. Thus the characteristics of an ovarian tumour are simulated. Further, in cases of large ovarian tumours it is not always possible to feel the uterus separate from the cyst.

A large *fibroid* is recognised by its slower growth, more solid consistence and more intimate relations to the uterus; and the uterine souffle may be heard. A normal fibroid should not cause difficulty; but when a fibroid has become soft, diagnosis is difficult, and when it is cystic, impossible, short of abdominal section.

*Tubal conditions* rarely produce a large tumour (as in fig. 13†). A *parovarian cyst* (springing from the parovarium in the broad ligament) is distinguished by its thinner wall and more distinct fluctuation; but here again certainty is reached only by abdominal section.

Tumours of the *omentum* are rare but may give rise to great difficulty. If the tumour does not extend as far as the brim we may, by getting round its lower margin and reaching the promontory, satisfy ourselves that it is abdominal not pelvic in origin. Omental tumours are sometimes malignant and the fluid present makes differential diagnosis very difficult.

A tumour of the *kidney*, such as hydronephrosis, may be mistaken for an ovarian cyst with a long pedicle; but renal tumours have an area of tympanitis over them. Examination of the urine may clear up the diagnosis. Tumours of the *spleen* and *liver* (hydatid) need only be mentioned.

The diagnosis of the *different forms of ovarian tumour* from one another is of great difficulty and often made only on the operating table. Nor from a practical point of view is it of great importance, because they all call for removal by operation. These general principles may, however, be noted: that careful palpation will distinguish between the solid and the cystic, and that the malignant are characterised by a more rapid growth with the development of ascites, while dermoid tumours are of slow growth and rarely attain a large size.

#### COMPLICATIONS OF OVARIAN CYSTS.

While the growth of an 'ovarian tumour' is usually uneventful, there are four conditions which may give rise to acute symptoms: torsion of the pedicle, rupture of the cyst, suppuration, and malignant degeneration.

As to the frequency of these complications, the Ward records give in a series of 100 cases of ovariectomy: twisted pedicle in 10,



ruptured cyst in 5, suppuration in 3, and malignant degeneration in 2. Such figures give merely some indication of relative frequency. Torsion of the pedicle is made too prominent, as a larger number of 'acute cases' are sent to hospital. Malignant degeneration is difficult to estimate; it is hard to say how many out of twelve cases of malignant tumour in this series were a 'degeneration' of an ovarian cyst.

1. **Torsion of the Pedicle.**—The pedicle of an ovarian tumour is comparatively thin, being composed of the upper part of the broad ligament, the uterine end of the Fallopian tube, the utero-ovarian ligament and the ovario-pelvic ligament. Through this pedicle the tumour derives its vascular supply by the ovarian artery and the anastomosis between the ovarian and uterine. If the tumour becomes twisted on

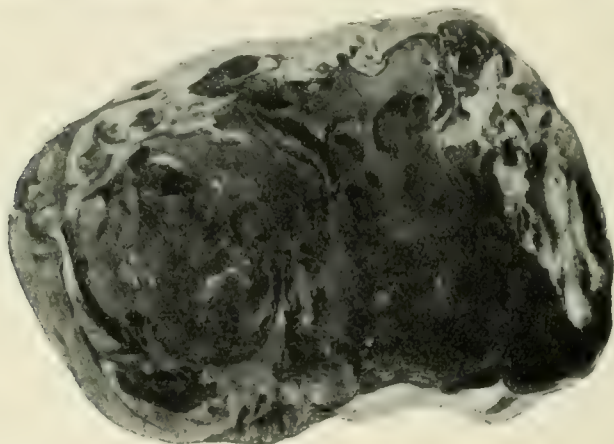


FIG. 167.—OVARIAN CYST WITH TWISTED PEDICLE.

The tumour appears almost black in parts owing to hæmorrhages into it, which have also broken down the loculi.

itself, the pedicle undergoes torsion. Fig. 172 shows this occurring in the case of a Parovarian cyst which has the same attachments as an Ovarian cyst. The venous return from the tumour is first interfered with, and if the twist becomes more marked the arterial supply is also cut off. The tumour becomes greatly congested and hæmorrhage occurs into the septa and the cysts (fig. 167). As the result of the congestion, intestinal and omental adhesions form, and there may be a secondary invasion of the tissues by the bacillus coli. If the twist is more acute and the arterial circulation interfered with, the tumour becomes gangrenous and the patient dies of peritonitis. The symptoms vary according to the amount of torsion and the tightness of the twist. In a typical case of complete torsion, the patient is suddenly seized with acute abdominal pain, accompanied by sickness and vomiting. The pulse becomes rapid



and thready, and she presents the anxious facies associated with acute abdominal lesions. On abdominal examination the tumour is found to have become larger, more tense, and tender. The presence of such symptoms and physical signs is diagnostic of the condition and ought always to be an indication for immediate operation.

If the twist is only a partial one or is loose, the symptoms are less severe. There is a certain amount of abdominal discomfort and pain which may not be sufficient to make the patient take to bed. The pain may continue for several days or weeks and the abdominal distension may increase. At any time there may be aggravation of the symptoms owing to increased torsion or to the congestion of the tumour. Usually in these cases of partial torsion adhesions form with the intestine and omentum, and there is risk of infection and suppuration. On abdominal examination the tumour is tense, and, as a rule, tender.

While ovarian cysts are always liable to torsion of the pedicle, the laxity of the ligaments seems to favour its occurrence in the puerperium and during pregnancy. Of this the following cases are illustrations.

'Mrs M., aged 32, twelve months ago had a normal confinement, when no tumour was noticed. Six months later patient noticed swelling of abdomen, and as there was amenorrhœa (nursing), thought she might be pregnant. Two days before admission to hospital, she was seized with an acute pain and had to lie up. The tumour became very tense and tender; and the uterus was felt behind it and (on rectal examination) to be small and separate from it. Patient had vomiting, a rapid pulse, and temperature 101°. On abdominal section, a multilocular ovarian tumour was found, of a dark blue colour, with hæmorrhages into the cavities, and the tube distended with blood. There were two complete twists in the pedicle from left to right.'

'Mrs. L., aged 26, one child four years ago, for some months has complained of abdominal discomfort. After two months of amenorrhœa she was seized three days ago with pain on the right side and vomiting. The case was diagnosed as one of appendicitis complicating pregnancy and admitted to hospital for operation. On vaginal examination, a pelvic tumour was felt suggesting a retroverted gravid uterus, while abdominal tenderness made bimanual examination impossible. Immediate operation was decided on and a cystic tumour found rising out of the pelvis to which the omentum and bowel were adherent. On sponging off the recent adhesions the tumour was seen to be an ovarian of the size of a coconut, with a twisted pedicle, beside which lay a small parovarian cyst also involved in the twist. The uterus was two months pregnant.'

**2. Rupture of the Cyst.**—This is not so serious a condition as torsion of the pedicle, as the results depend more on the character of the contents than on the actual rupture. Some cases, described as 'acute rupture', are immediately serious, possibly through hæmorrhage and the escape of

irritating contents; but in the majority of cases the attention of the patient or physician is directed to its occurrence by the change in the abdominal swelling.

A case of acute rupture has symptoms similar to acute torsion of the pedicle, but the physical signs differ. The tumour, previously easily palpable, becomes indefinite in outline; and if its contents have entirely escaped it may be unrecognisable on abdominal examination.

In most cases of rupture the result depends on the character of the contents. The following cases illustrate the *clinical phenomena* of the two common types.

'Mrs. A., aged 64, multipara, was admitted to Ward 35, complaining of swelling of the abdomen which had been noticed for twelve months, but with no other symptoms. On examination a cystic tumour was found extending almost up to the umbilicus. As the patient lay on her back there was some fulness in the flanks and a dull note on percussion which varied with the position of the patient. On opening the abdomen a large quantity of straw-coloured fluid was found, and also an ovarian cyst with a rent in the wall from which the abdominal fluid had come. The cyst was removed and the abdomen washed out. The patient made a rapid recovery. There were no data to determine when this cyst had been ruptured. The development of the abdominal swelling had been uneventful, and it was for it alone that the patient sought advice.'

In contrast to this case is the following one:—'Mrs. P., aged 61, complains of swelling of the abdomen of eight months' duration. Occasionally the size of the swelling incommodes breathing, but apart from its bulk no other symptom is noted. The abdomen is symmetrically distended, the swelling appearing to occupy the whole of the abdominal cavity; the umbilicus is flattened. Palpation gives the impression of a non-solid tumour, but no fluctuation is obtained. On vaginal examination, the vagina, especially the anterior wall, bulges downwards with a diffuse swelling in which the uterus cannot be defined. On abdominal section, as soon as the peritoneal cavity was opened there welled forth a semi-fluid gelatinous substance of the colour of calves'-foot jelly. A large quantity of this was evacuated, basin after basin being filled. The cyst from which this pseudo-myxomatous material exuded was then seen pearly-blue in colour, with walls so friable that they tore in shreds as the tumour was removed. The intestines and parietal peritoneum were covered with a gelatinous growth exhibiting when floated in water numerous papillary processes. The omentum and mesentery were likewise infiltrated and apparently gelatinised. The broad ligament was so changed by infiltration that it and the other soft landmarks were difficult of recognition. With some difficulty the infundibulo-pelvic and ovarian ligaments on the left side were tied off and the mass removed. Patient made a good recovery.'

To the condition found in this last case the name *pseudomyxoma peritonei* is given. The affection of the peritoneum suggests malignancy, but the majority of the cases show no recurrence. In one case we have seen the patient return with a malignant peritonitis.

While the rupture of a Parovarian cyst may result in a natural cure, and the rupture of an Ovarian cyst, though symptomless, leaves the tumour to continue to grow, the rupture of a Papillomatous cyst causes implantation growths of a malignant nature and the case will run a rapid course.

3. **Suppuration.**—This is a still rarer occurrence if we exclude the changes secondary to torsion of the pedicle. Dermoid tumours are most liable to it. The infecting organism may be a staphylococcus, streptococcus, or bacillus coli: in one case of dermoid tumour, we found the tubercle bacillus to be the cause. The symptoms are gradually increasing pain in the abdomen, elevation of temperature, and rapidity of pulse. On abdominal palpation the tumour is tender and is increased in size. There is progressive leucocytosis.

4. **Malignant Change.**—When a simple adenoma undergoes malignant change there is a rapid increase in the size of the swelling. The patient's general health deteriorates, and later she becomes emaciated. On abdominal examination, in addition to the tumour the presence of free fluid can be detected. Such tumours usually are papillomatous, and implantation growths form on the various peritoneal surfaces, while metastatic deposits may be present elsewhere in the body.

#### BROAD LIGAMENT CYSTS.

These are cystic tumours growing from structures situated between the two layers of the upper part of the broad ligaments. Clinically they closely resemble ovarian cysts, but morphologically and pathologically they differ from them.

The **Parovarian Cyst** is the most important, as it may grow to as large a size as an Ovarian Tumour. It is supposed to develop from the Parovarium, or Wolffian body, which lies between the ovary and the ampulla of the tube (see fig. 127), and of which Gartner's canal forms the duct (see fig. 173). The microscopic appearance of the broad ligament in this area is shown in fig. 168. Keith believes that the large Parovarian tumours develop in connection with the ovarian fimbria of the tube and that true Parovarian cysts never attain a large size.

Arising beside the ovary, a Parovarian cyst (fig. 169) has the same position and attachments as an Ovarian cyst and may develop a pedicle in the same way. Its surface, however, presents a marked contrast, for it shows a network of veins in the delicate connective tissue of the broad ligament covered with the glistening peritoneum. The ovary may be seen distinct from it (figs. 169, 170); but if the tumour is large,

becomes thinned out and incorporated with its wall. The Fallopian tube may be separate (fig. 169), but in the case of large tumours can be traced with difficulty as a mere band breaking up into attenuated fimbriae in the thin wall of the cyst. The cyst is always unilocular, is lined with a

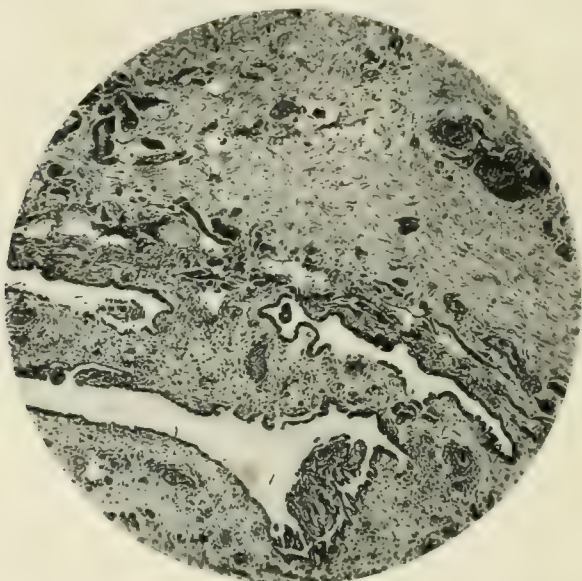


FIG. 168.—SECTION OF BROAD LIGAMENT SHOWING PAROVARIAN TUBULES.

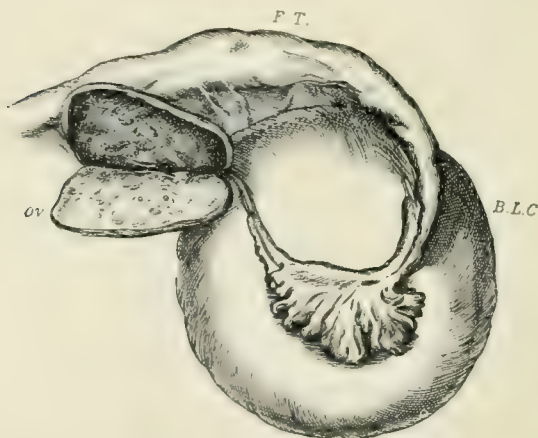


FIG. 169.—A SIMPLE BROAD LIGAMENT PAROVARIAN CYST.—(DORAN.)  
OV. Ovary split open ; F.T. Fallopian Tube ; B.L.C. Broad Ligament Cyst.



cubical epithelium and contains a watery solution of salt with sometimes a trace of albumen.

The Parovarian tumour is a distension phenomenon rather than a neoplasm and does not affect the patient's health or bring about a fatal

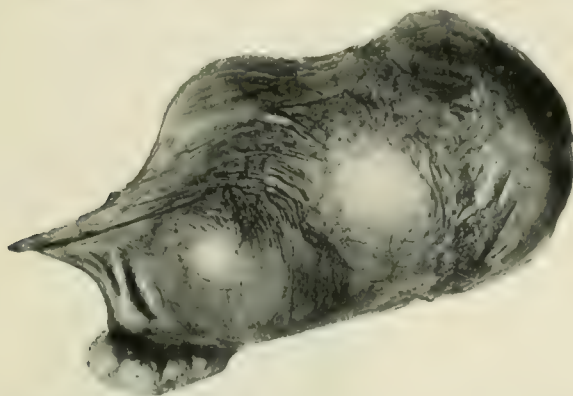


FIG. 170.—PAROVARIAN CYST SHOWING OVARY BELOW, AND TUBE STRETCHED ON THE CYST, ABOVE.

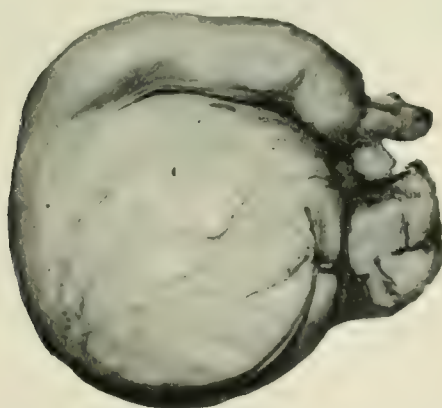


FIG. 171.—DILATED TUBE SIMULATING BROAD LIGAMENT (PAROVARIAN) CYST.

The ovary is to the right, and the dilated end of the tube curves in towards it.

result in the same way as an Ovarian tumour. It may, however, prove serious through the development of a papilloma in its wall.

**Clinical Phenomena.**—A *small Broad Ligament* cyst cannot be diagnosed, except by abdominal section, from a small Ovarian cyst or a dilated tube (hydrosalpinx). It is difficult to recognise the ovary (fig. 170) clinically; and even in a naked-eye specimen a dilated tube may simulate a Broad Ligament cyst (see fig. 171). Careful examination shows



that the fimbriated end of the tube is not seen, being adherent to the ovary.

A large *Parovarian cyst* filling the abdomen differs from an Ovarian cyst in the following features. It is of slow growth, has thin walls, and being mono-cystic gives fluctuation with great distinctness. It suggests in the first instance ascites, but more careful examination shows that the fluid is encysted. On opening the abdomen, the tumour is seen to be covered by peritoneum; and after removal the ovary and tube will be found separate from it, or thinned out and stretched in the wall.

The slow development of a Parovarian cyst, its temporary cure by tapping, and the large size it may attain are well illustrated by the following case:—

‘J. D., age 33, has noticed swelling of abdomen for six months,



FIG. 172.—PAROVARIAN CYST WITH TWISTED PEDICLE.

The fimbriated end of the tube is greatly congested.

with some pain for three months in left iliac region. Five years ago a swelling, similar to the present, was noticed; and after twelve months, was tapped, and eight pints of clear fluid drawn off. Menstruation regular. Abdomen distended to size of an eight months' pregnancy, with a globular swelling. Surface uniform. Fluctuation very marked all over it. Dulness over abdomen, except in lumbar, epigastric, and hypochondriac regions. Auscultation negative. On vaginal examination, the fluctuating tumour is felt, with the uterus separate from it and retroverted. Abdominal section showed a thin-walled cyst, covered by peritoneum, with dilated veins. Ten pints of clear light yellow fluid drawn off. Pedicle secured by double ligature, and cyst removed. Cyst unilocular; ovary and tube seen stretched on wall of cyst, from which also peritoneum could be easily stripped. Recovery.'

Torsion of the pedicle is less frequent in Parovarian than in Ovarian cysts, though the specimen seen in fig. 172 shows that it may occur.

**Other Broad Ligament Cysts** call for mention only. They may arise from the duct of the Wolffian body, which sometimes persists as Gartner's canal. 'Gartnerian cysts' extend downwards to the side of the uterus and may project into the vaginal fornix. The 'hydatid of Morgagni' is a minute stalked cyst attached to the outer end of the tube. It is present in some 8 per cent. of adults, and is of no clinical importance. 'Kobelt's tubules' may also dilate into minute cysts. 'Ovarian hydrocele' is a term applied to the distension of a pocket of peritoneum in which the ovary is placed and into which the tube opens—the persistence of a condition found in some mammals.

**Origin of Ovarian and Broad Ligament Cysts.**—There has been much difference of opinion as to the origin of these tumours; the most

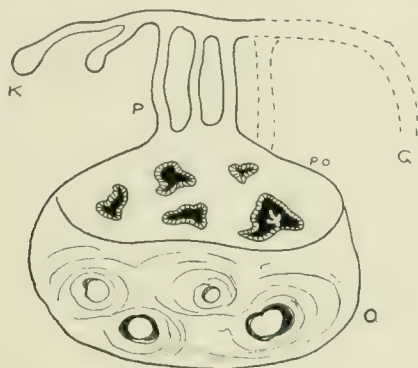


FIG. 173.—DIAGRAM SHOWING ORIGIN OF TUMOURS ARISING FROM AND NEAR THE OVARY.

O. Oöphoron—from which the Graafian follicles arise; P.O. Paroöphoron—hilum of ovary which contains remains of the Wolffian body; P. Parovarium; K. Kobelt's tubules; G. Gartner's canal—the duct of the Wolffian body.

important facts will be evident from a study of the diagram given in fig. 173. It shows the ovary consisting of the *oöphoron*, which contains the Graafian follicles, and *paroöphoron* or hilum; also the parovarium or *epoöphoron* consisting of a 'horizontal duct', continued towards the uterus as Gartner's canal, and 'tubules', some of which run vertically towards the hilum of the ovary, which they enter while others curve outwards as Kobelt's tubules. From the distended Graafian follicles is formed the *Cystic ovary* and from the germinal epithelium which in the foetus develops into those follicles or from other 'epithelial rests' springs the *multilocular ovarian cyst*. From the ova may arise, by parthenogenesis, the *Dermoid cyst*. The *papillomatous cyst* is supposed to arise from Wolffian relics in the paroöphoron or hilum. Of Broad Ligament cysts the *Parovarian* is considered by many to rise from the vertical

tubules of the Parovarium, though Keith would refer it to the Müllerian duct, which gives origin to the Fallopian tube. Cysts may also arise from Kobelt's tubules and Gartner's canal.

### PERITONITIS AND CELLULITIS.

If we ask why pelvic peritonitis and cellulitis, rare in the male, are of frequent occurrence in the female, we find the explanation in the fact that the *anatomical relation of the parts favours the invasion of micro-organisms*. The peritoneum and cellular tissue are brought into relation with the external skin surface through the mucosa which stretches from the vaginal orifice to the fimbriated end of the Fallopian tube. Infection of this mucosa is favoured by the changes connected with menstruation, and the raw surfaces produced by abortion and childbirth.

As to *terminology*, the pelvic peritoneum has been called the *perimetrium* in contra-distinction to the cellular tissue round the uterus, or *para-metrium*, and the terms 'peri-metritis' and 'para-metritis' have been applied to inflammation of these tissues. It is simpler, however, to speak of pelvic 'peritonitis and cellulitis'. The recognition of these conditions rests on a knowledge of the *distribution of the peritoneum and cellular tissue* as well as of the *pathological changes* arising in the course of inflammation, or resulting from it.

**Anatomy of Peritoneum and Cellular Tissue.**—The disposition of the peritoneum in the middle line will be evident from a study of the section given in fig. 6. It passes from the abdominal wall on to the upper surface of the bladder, from which it is reflected on to the anterior aspect of the uterus at the level of the os internum, the cervix not being covered with peritoneum anteriorly. Passing over the fundus and down the posterior aspect of the body of the uterus, it covers the upper third of the cervix posteriorly, extending down the posterior vaginal wall for about an inch, being reflected from that on to the rectum, forming the pouch of Douglas. Thus, two folds or pouches are produced, one in front of the uterus or 'utero-vesical', which is always of the same depth, extending to the os internum; the other, that behind the uterus, varying in its depth, the pouch of Douglas sometimes extending to the apex of the perineal body. The anterior pouch is empty, appearing in a section of the pelvis as a mere slit. The posterior contains intestines except in its deepest part. When the uterus is retroverted, the anterior fold opens out and contains intestines, while the posterior is empty or may contain the retro-flexed fundus.

At the sides of the uterus the peritoneum passes to the side wall of the pelvis as the anterior and posterior layers of the broad ligament. The relation of the peritoneum to the lateral fornix is evident from fig. 7.

Behind the uterus the utero-sacral ligament passes from the junction of the cervix and body to the third sacral vertebra. These utero-sacral ligaments, which form the lateral boundaries of the deep part of the pouch of Douglas, are well seen in fig. 8.

The coronal section of the pelvis given in fig. 174 shows somewhat diagrammatically the relation of the cellular tissue at the sides of the uterus. It is seen to extend between the layers of the broad ligament passing upwards into the iliac fossa and downwards as far as the fascia covering the levator ani.

A vertical section along the line BB in fig. 174, and cutting across the lateral fornix, is shown in fig. 175. In it we look through the left lateral fornix, like a window, into the vagina, and see the cervix. In the front is the cellular tissue at the base of the broad ligament with the ureter lying in it, in front of which again is a corner of the bladder. We see how the cellular tissue extends from the broad ligament forwards round the bladder and backwards towards the rectum.

In the horizontal section (fig. 176) the cervix is divided below the level of the os internum with, in front of it, the bladder, and, behind it, the peritoneum of the deep part of the pouch of Douglas and the rectum. Here again is evident the continuity of the cellular tissue of the broad ligament with that round the bladder, and through the utero-sacral ligament, with that round the rectum. Thus it comes about that inflammation in the cellular tissue around the cervix, due to infection through the cervical canal, may spread forwards round the bladder, outwards through the broad ligament, or backwards through the utero-sacral ligament. Similarly, infection from the rectum may start a cellulitis extending forward in the utero-sacral ligament to the cervix. These anatomical considerations give a basis for the diagnosis of peritonitis and cellulitis. An exudation in the pelvis is recognised as peritonitic or cellutic according to its position, and the line of its advance as it spreads.

**Pathological Changes in Inflammation.**—As we have mentioned, *pelvic peritonitis* is usually the result of an extension from the uterus through the Fallopian tubes. The infecting organism may be the streptococcus, the staphylococcus, gonococcus, or bacillus coli. Usually the infection remains localised to the pelvis and shows little tendency to become generalised over the abdominal peritoneum. A pelvic peritonitis is a much less serious affection than a corresponding lesion in the upper part of the abdomen. The peritoneal inflammation may result in a matting of all the pelvic organs, with formation of adhesions between them and coils of intestine lying within the pelvic cavity. In considering retroversion of the uterus, reference was made to its being the result of adhesions in the pouch of Douglas (fig. 33); and figs. 177 and 178 show how the uterus and its appendages may be bound down. Pelvic peritonitis is recognised therefore in the fixation of structures rather than in an exudation



that can be palpated. In some cases, however, after the peritoneum has been shut off by adhesions, a serous or purulent effusion forms in the pelvis which distends one or all of the peritoneal pouches, most frequently the pouch of Douglas (fig. 179). Such an effusion can be readily recognised on vaginal and recto-vaginal examination. With the forefinger in the vagina and the middle finger in the rectum (see fig. 12), a tense swelling is felt between the fingers. The lower edge is rounded and descends to the junction of the upper and middle thirds of the posterior vaginal wall. When the effusion consists of serum, spontaneous absorption may occur.

If pus forms, it usually discharges into the bowel, sometimes into the

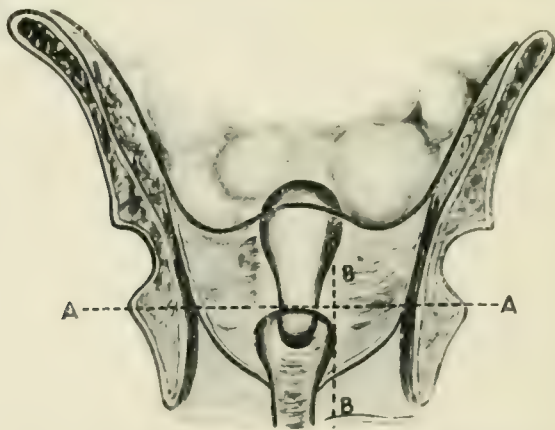


FIG. 174.—CORONAL SECTION OF PELVIS.—DIAGRAMMATIC.

This shows diagrammatically the relation of the peritoneum and cellular tissue beside the uterus. The posterior layer of the broad ligament is removed to show the continuity of the cellular tissue in that ligament with that in the iliac fossa and at the side of the upper part of the vagina as far as the levator ani.

bladder or vagina; and when it has risen out of the pelvis, it may point through the abdominal wall. These cases of pelvic abscess are usually the result of a tubal infection, but they occasionally arise from an appendicitis where the appendix is hanging over the pelvic brim. The initial symptoms are those of salpingitis or appendicitis. The subsequent formation of pus is indicated by the continuance or aggravation of pain, together with irregular rises in temperature with or without rigors and an increasing leucocytosis. On vaginal examination it may be impossible to say whether the swelling felt is entirely due to a collection in the peritoneum or is partly tubal.

Two forms of chronic peritonitis of pelvic origin call for special mention in both of which the abdominal peritoneum comes to be involved,



namely, the Tuberculous and Malignant. *Tuberculous peritonitis* in the female has often its starting-point in the Fallopian tube. The pathology of this has been already described on pages 134-8. In all cases where

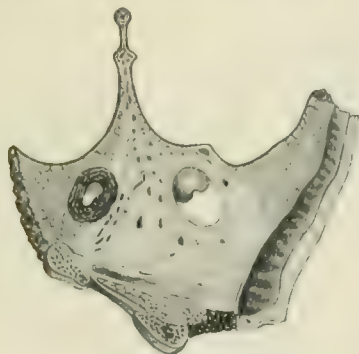


FIG. 175.—VERTICAL SECTION OF THE BROAD LIGAMENT AND PELVIC CELLULAR TISSUE ALONG THE LINE BB IN FIG. 174.—(After FREUND.)

The vagina is divided in the lateral fornix, showing the cervix. A corner of the bladder is cut through with the ureter behind it. The rectum is also divided. Note the continuity of the cellular tissue in the broad ligament with that round the bladder and the lateral fornix, and its extension towards the rectum in the utero-sacral ligament.



FIG. 176.—HORIZONTAL SECTION THROUGH THE LINE AA IN FIG. 174.

Note from before backwards the bladder, the cervix with the ureters on either side, the peritoneum of the pouch of Douglas, and the rectum. Note how the cellular tissue round the cervix, in which the ureter lies, passes outwards to the side wall of the pelvis and backwards along the sides of the pouch of Douglas to the rectum.

tuberculous peritonitis is suspected, the uterine appendages should be carefully examined, either bimanually or when abdominal section is performed. *Malignant affection of the peritoneum* is in the female also

frequently secondary to malignant disease of the ovary. We have already referred to ascites as a characteristic feature of this condition (see p. 173). Its presence usually means that the peritoneum is affected with secondary growths. These may be recognised on combined recto-

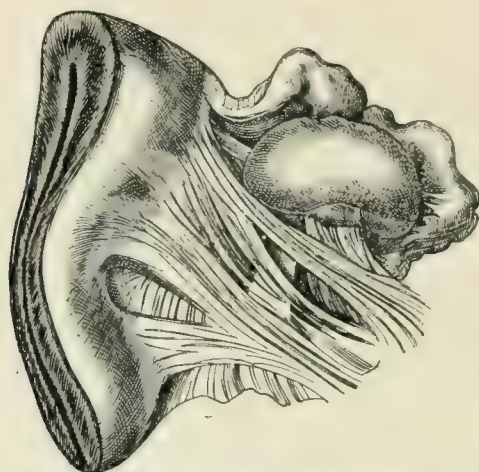


FIG. 177.—PERITONIC ADHESIONS DRAWING THE UTERUS TO ONE SIDE.—(HEITZMANN.)

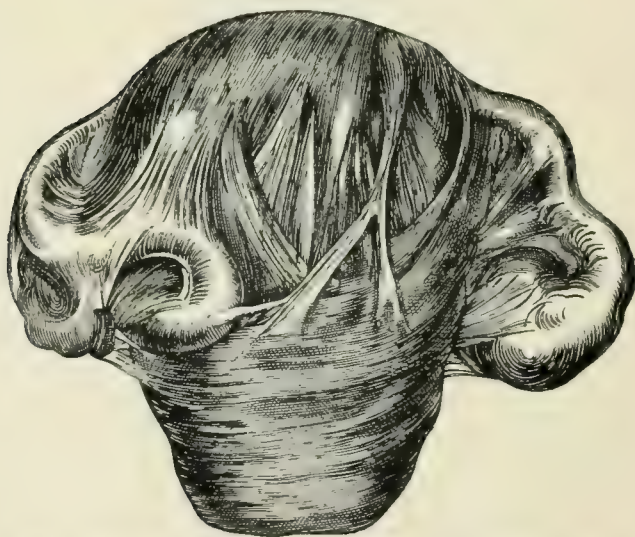


FIG. 178.—PERITONEAL BANDS BINDING DOWN THE UTERUS, TUBES AND OVARIES—result of chronic pelvic peritonitis.—(HEITZMANN.)

vaginal examination, when the nodules may be detected lying between the fingers ; but certainty is only reached on abdominal section.

In *pelvic cellulitis* the infecting organism gains access to the cellular tissue through the lymphatics from the cervix. It is thus most frequently met with in the puerperium, and is one of the common forms of puerperal sepsis. Lacerations of the cervix being most common at the side, especially the left side, pelvic cellulitis most frequently occurs in the tissue at the base of the broad ligaments. In this situation the organisms cause an inflammatory exudation. The tissues become extremely oedematous, proliferation of the cells takes place, and the result is the production of a firm swelling at the side of the uterus (fig. 180). The inflammation may extend forwards to the cellular tissue between uterus and bladder (fig. 181) or between bladder and abdominal wall. It may

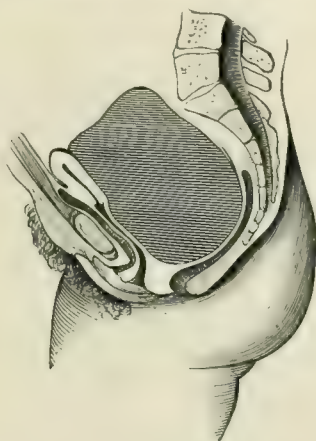


FIG. 179.—PERITONITIC EFFUSION DISTENDING POUCH OF DOUGLAS.

extend backwards along the utero-sacral ligaments to the front of the sacrum, embracing the rectum (see fig. 13), or it may spread outwards to the side of the pelvis. Such an inflammatory exudation may attain a large size, pressing the uterus to the opposite side of the pelvis and rising up so as to be distinctly palpable through the anterior abdominal wall. The subsequent course of the condition varies. Spontaneous absorption may take place, leaving only some cicatrization of the connective tissue. Sometimes the inflammatory process goes on to suppuration and the formation of a pelvic abscess, as has been already described in connection with pelvic peritonitis. In some rare cases gradual changes take place in the cellular tissue producing a diminution in the blood-supply to the uterus and its appendages, resulting in atrophy—so-called *para-metritis atrophicans*.

**Clinical Phenomena.**—Clinically the two conditions may be con-

sidered together, as it is often impossible to distinguish between them, and in many cases both are present. A definite etiological factor can usually be found, most frequently labour or abortion. In such cases the initial symptoms usually show themselves about the third or fourth day of the puerperium. There is pain in the lower part of the abdomen, rise in temperature and rapid pulse, tenderness and resistance over the brim of the pelvis; and in a day or two a distinct swelling may be felt. In acute cases the posture is suggestive, the patient lying on her back with knees drawn up; in an extensive unilateral cellulitis, only one knee may be drawn up—to relieve tension on the affected side. On vaginal examination a thickening is felt beside the uterus, its situation depending upon the position of the exudation. The swelling, in the case of cellulitis, is firm and has been likened to plaster of Paris. It

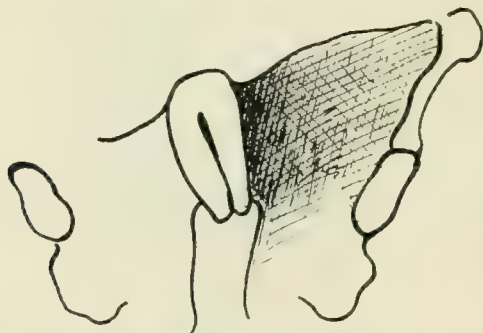


FIG. 180.—CELLULITIS IN THE LEFT BROAD LIGAMENT, EXTENDING UPWARDS INTO THE ILIAC FOSSA.

Note that the uterus is pushed to the right and is not separate from the exudation.

renders the uterus fixed and immobile, and in some cases it may be impossible to differentiate the uterus from the surrounding swelling. In cases of peritonitis there may be a distinct localised swelling, as in fig. 179, but more usually there is only a matting-down of the tissues affecting their mobility (fig. 178).

‘The case of which fig. 180 is a diagrammatic representation had the following history:—

‘Mrs. L., aged 25; 2-para. Five weeks ago an abortion at the sixth week. A week later hæmorrhage, and foul discharge with pain in abdomen and fever.

‘On admission, a firm swelling in the left iliac region, which on bimanual examination was found to be a large cellulitic deposit in the left broad ligament—tender on pressure. Uterus not separate but large, and pressed to right side of pelvis; cervix admitted tip of finger.’

A comparison of fig. 180 with fig. 174 brings out how the normal



anatomical relations form the basis of diagnosis, the exudation occupying the position of the upper part of the broad ligament and extending towards the iliac fossa.

Fig. 181 shows a cellulitis lower down in the pelvis, and with it the normal distribution of the cellular tissue given in fig. 176 should be studied. The history of this case was as follows:

'Mrs. B., aged 23; 3-para. Last child delivered with forceps. Rose on fifth day, but had to return to bed on account of abdominal pain and shivering. Lochial discharge stopped, and she was feverish. Got up again eight days later, but had to return to bed on account of abdominal pain, and remained there till admission five weeks after confinement.

On admission temperature  $102^{\circ}$ , pulse 100. Complained of difficulty in defecation and of frequency and pain on micturition. A firm

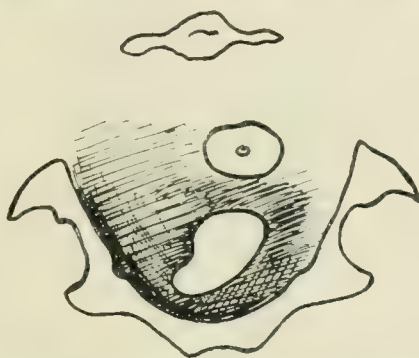


FIG. 181.—CELLULITIS LOWER DOWN IN THE PELVIS, WHICH HAS EXTENDED FORWARDS BETWEEN THE UTERUS AND BLADDER AND SURROUNDS THE LATTER.

swelling above brim of pelvis reaching to within 3 in. of umbilicus on right side and 2 in. on left. *Per vaginam* a firm deposit in front of cervix pushing the latter back and also extending into right fornix—continuous with abdominal swelling. No fluctuation detected. Posterior fornix empty.'

**Utero-Sacral Cellulitis.**—A common site for chronic cellulitis in the pelvis is the utero-sacral ligament. The infection in this case may proceed either from the cervix or from the rectum. The latter source accounts for the not infrequent cases in nulliparous women. As the result of cicatrization following the inflammation, shortening of the ligaments occurs. The uterus is thus pulled on at the junction of the body and cervix, and the condition of acquired ante flexion produced (fig. 182—see also fig. 31). The uterus as a whole is pulled back in the pelvis while the forward inclination of the body on the cervix is exaggerated. It is a condition frequently met with and presents characteristic symptoms and



physical signs. The common symptom is pain over the sacral region aggravated at the menstrual periods and on exertion, sometimes especially on defaecation. On vaginal examination, the cervix is far back in the pelvis. The external os is frequently directed forwards as in retroversion. On careful bimanual examination, however, the fundus is felt lying to the front, and the finger can be placed in the angle of flexion between



FIG. 182.—SECTION OF PELVIS SHOWING DISPLACEMENT PRODUCED BY UTERO-SACRAL CELLULITIS.—(BERRY HART.)

Note thickening of utero-sacral ligament and acute anteversion of uterus, which [is also drawn back in the pelvis.

it and the cervix. Through the posterior fornix the tense utero-sacral ligaments are felt stretching towards the sacrum. If they are not distinctly palpable they can be rendered so by pressing the cervix from behind towards the symphysis pubis. The ligaments can then be felt as tense bands, and at the same time the patient complains of pain. Examination *per rectum* is of service where it is difficult to recognise the position of the uterus bimanually.

#### PELVIC HÆMATOCELE.

This term is applied to hæmorrhage into the peritoneal cavity shut off by adhesions. Free internal hæmorrhage usually results in the death of the patient. The limiting adhesions produce a distinct tumour similar to the peritonitic exudation shown in fig. 179. The term 'hæmatoma' has been applied to hæmorrhage into the cellular tissue such as occurs when a tubal gestation ruptures into the broad ligament. As it is difficult, without an exploratory incision, to say whether an effusion is intra- or extra-peritoneal, the term 'hæmatocele' is used to cover both conditions.

Hæmatocele is usually the result of a *ruptured tubal gestation*, under which heading it has been considered on page 144. Fig. 183 is from

an interesting case in this connection. The extra-uterine gestation ran its course without marked symptoms in the earlier months until it had attained such a size that it was diagnosed as a case of retroversion of the gravid uterus. The patient subsequently died from a large hæmatocele,

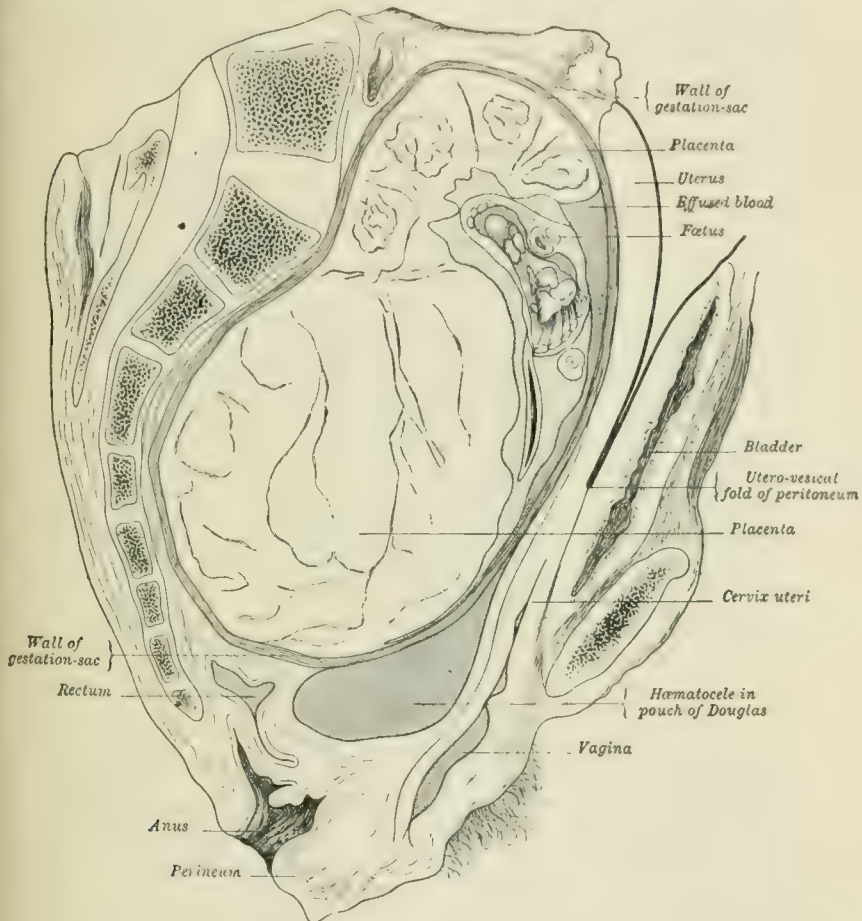


FIG. 183.—EXTRA-UTERINE GESTATION,

which ended in hæmatocele, causing the death of the patient. The drawing is from a frozen section and shows the exact relation of the structures during life.

which is seen in the pouch of Douglas, though the greater part was alongside the gestation-sac and extended into the abdominal cavity. The patient died from the hæmorrhage though it was encysted. We obtained the specimen from the post mortem, and the appearance of the tumour in the frozen section shows the uterus incorporated with the

anterior wall of the sac and a displacement of vagina and bladder similar to what occurs in gravid retroversion.

Rarely does hæmatocele arise from *internal hæmorrhage at the menstrual period*, which has been attributed to the rupture of the Graafian follicle or of a vein in the broad ligament, or to hæmorrhage from the fimbriated end of a Fallopian tube. That this does sometimes occur has been shown from cases of abdominal section done for symptoms of internal hæmorrhage. It is noteworthy that in most of these cases there was not true hæmatocele, the blood not being encysted.

**Clinical Phenomena.**—The symptoms are those of internal hæmorrhage in a patient suffering from extra-uterine gestation. Rarely does hæmatocele occur apart from this—during a menstrual period. Examination shows a bulging tumour varying in size according to the amount of effusion. If large and retro-peritoneal, in the pouch of Douglas, the cervix may be displaced upwards and be almost inaccessible (fig. 179). When the hæmorrhage is between the layers of the broad ligament the uterus is pushed over to the opposite side and cannot be felt separate from the effusion. After the blood coagulates, the tumour becomes less defined, and if absorption takes place it gradually disappears. Should suppuration occur it will increase in size again, with the other symptoms of pus formation.

Having considered the Pathological Conditions of the Uterus and its Appendages and the adjacent Peritoneum and Cellular Tissue, there remain only those of the Vagina, Pelvic Floor, and Vulva, which call for briefer notice. Morbid conditions of the Bladder and Rectum lie beyond the scope of this book.

## AFFECTIONS OF THE VAGINA.

**Anatomy and Physiology.**—The vagina extends from the vulva upwards and backwards for three inches, in a direction parallel to the conjugate of the brim (see figs. 4 and 6). As its walls, like those of the body of the uterus, are anterior and posterior, it appears on a section of the pelvis like a cleft in the pelvic floor (fig. 184, A). The folding of the walls at the sides gives an H-shaped appearance on cross section (fig. 185). Into the upper third of the anterior wall projects the vaginal portion of the cervix uteri (fig. 184, B), which has been described on pp. 53, 54. This occupies the upper inch of the anterior vaginal wall, so that this wall measures only two inches while the posterior measures three. The muscular wall consists of two layers, an internal circular one, and an outer longitudinal which is not so well developed. There is no true sphincter for the vaginal orifice, but the anterior fibres of the levator ani

and the superficial perineal muscles act as a kind of sphincter, the spasmodic contraction of these giving rise to the pathological condition known as Vaginismus.

The naked-eye appearance of the anterior vaginal wall is shown in fig. 186. Its lateral boundaries are not parallel, as the laid-open specimen makes them appear, but converge at the lower end towards the vulva, the orifice of which is antero-posterior and at right angles to the vaginal cavity.

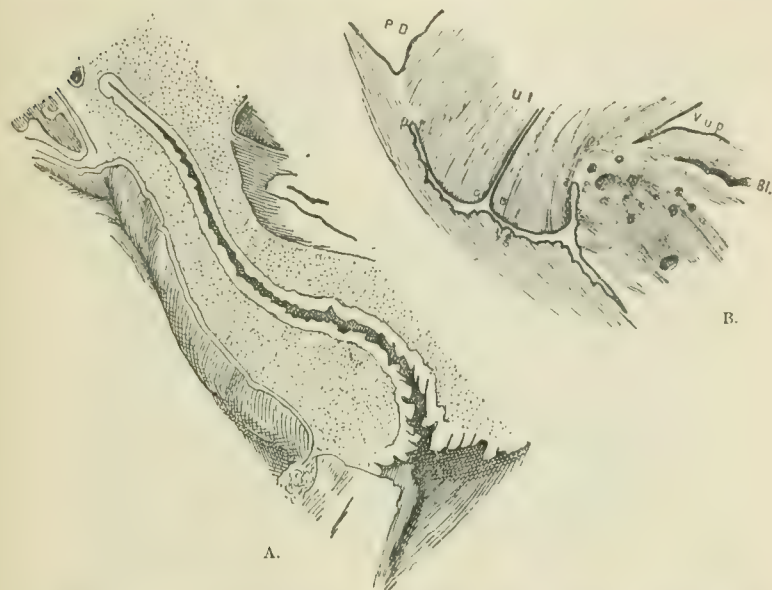


FIG. 184.—A. SECTION OF VAGINA PASSING THROUGH LATERAL FORNIX; AND B. SECTION OF UPPER THIRD PASSING THROUGH THE CERVIX (natural size).—(HART.)

P.D. Pouch of Douglas; ut. Uterus; o.e. Os Externum; vg. Vagina; p.f. Posterior fornix; a.f. Anterior fornix; V.u.p. Vesico-uterine peritoneum; Bl. Bladder. Note the signoid form of the vagina with its walls in apposition.

We note the transverse rugæ and at the lower part the vertical mesial fold, sometimes double, known as the anterior vaginal column. The posterior wall is similar but longer, and shows also transverse rugæ and a less well-developed posterior vaginal column.

Microscopically the mucosa consists of connective-tissue papillæ covered with several layers of squamous epithelium (fig. 187). It has no mucous glands with ducts, and thus resembles a skin surface rather than a mucous membrane. Consequently, the inflammatory changes described as 'Vaginitis' are allied to those occurring in the skin rather than a



mucous membrane. This peculiarity of anatomical structure has also a bearing on infection. The vagina is even more proof than the skin against micro-organisms, since its epithelial protection is not weakened by hair follicles, sweat or sebaceous glands.

The vaginal secretion is a transudation from the blood-vessels, mixed

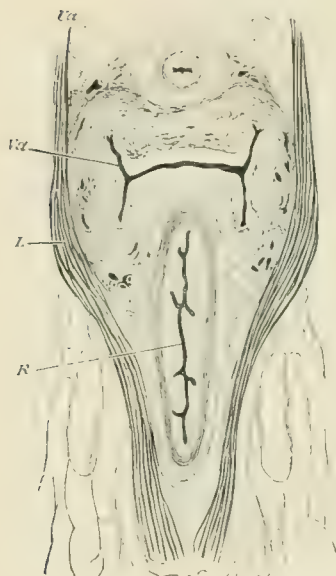


FIG. 185.—PELVIC FLOOR IN CROSS SECTION.—(HENLE.)

*Ure*, Urethra, *Va*, Vagina, *R*, Rectum, and *L*, Levator ani. Note H shape of vagina on cross section.

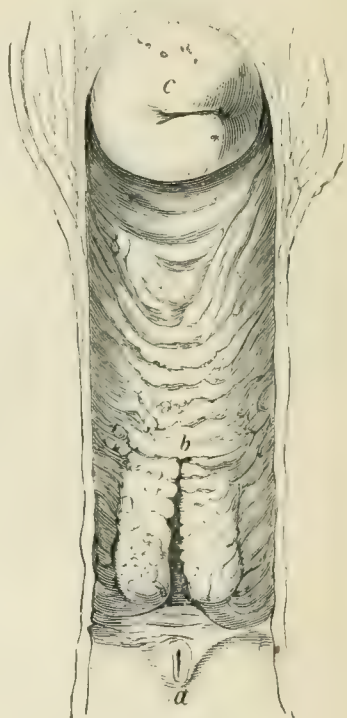


FIG. 186.—ANTERIOR VAGINAL WALL AND MULTIPAROUS CERVIX LOOKED AT FROM BEHIND (natural size).—HENLE.)

*a*, Urethral orifice; *b*, Anterior vaginal column; *c*, Cervix uteri.

with mucus secreted by the cervix. It contains vaginal epithelium, and a bacillus described by Döderlein, which causes the acid reaction of the vaginal secretion. Döderlein drew a distinction between physiological and pathological secretions. The former is acid and contains this bacillus; the latter is feebly acid, neutral, or alkaline, and shows different micro-organisms, saprophytic and pathogenic. Did this distinction hold, the study of infection would be simplified; for the discharge becomes alkaline



at the menstrual period, during the puerperium, and in certain forms of leucorrhœa. Thus conditions arise in the vagina favourable to the growth of micro-organisms, and clinical experience shows that it is at these times that a patient is most liable to infection. The results of later investigators (Kronig, Menge and Walthard) do not support Doderlein's view, but show that the question is a much more complex one and that several factors are at work which call for further investigation. It is, however, a well-established fact that, while a great variety of micro-organisms may be found at the vulvar orifice and in the lower third of the vagina, the upper third, while not sterile like the higher areas of the genital tract, does not contain pathogenic micro-organisms, the normal secretion being unfavourable to their growth.

*The anatomical relations of the vagina to surrounding structures call*

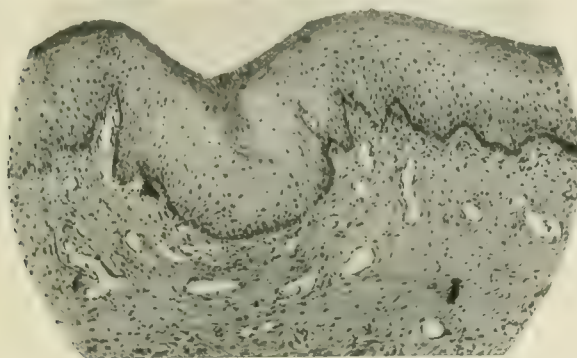


FIG. 187.—VAGINAL MUCOUS MEMBRANE.

The stroma is ordinary connective tissue and the covering a stratified squamous epithelium. There are no glands.

for special reference from their bearing on gynecological diagnosis and the development of certain pathological conditions.

*In front* the vagina is in relation to the urethra and the neck of the bladder—(see Section given in fig. 6). Hence the sound or catheter, passed into the urethra, is distinctly felt through the anterior vaginal wall. Further, the position of the neck of the bladder allows of its being palpated through the anterior vaginal fornix, and any body present in the bladder, *e.g.* a calculus or tumour, can be recognised on bimanual examination. *Behind* it is separated from the anus by the triangular perineal body, above which is the thin recto-vaginal septum. Consequently, any body in the rectum is easily felt through the posterior vaginal fornix. Reference has frequently been made to the value of the combined recto-vaginal examination (see fig. 12) in recognising pathological conditions present in the pouch of Douglas. *At the sides* we note the

convergent levator ani muscles—(seen in vertical section in fig. 174 and in cross section in fig. 185)—which with the pelvic fascia unite in the middle line to complete the pelvic floor.

Under Pathological Conditions of the Vagina we have to consider Malformations, including Atresia, Displacement of the vaginal wall downward, Fistula, Inflammation—Vaginitis, Vaginismus and Tumours.

**Malformations.**—Developmentally the vagina is double like the uterus, being produced by the coalescence of the ducts of Muller. If the septum between these persists, the vagina is divided by a vertical partition as was described in the case of the uterus (see p. 38).

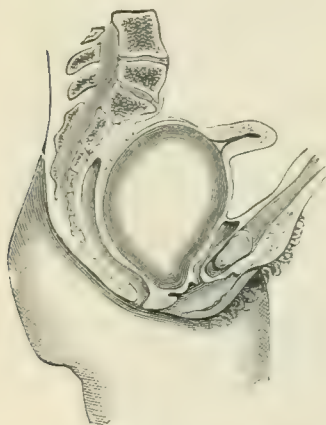


FIG. 188.—ATRESIA OF HYMEN.—  
(SCHROEDER.)

Note the bulging of the hymen and the cystic tumour occupying the pelvis, recognised by the finger per rectum.

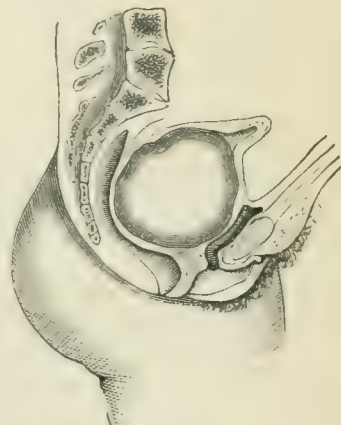


FIG. 189.—ATRESIA OF VAGINA.—  
(SCHROEDER.)

Note that the pelvic tumour is as in fig. 188, while there is no bulging of the hymen.

Non-development of the lower portion of the ducts produces atresia of the vagina. With this it is convenient to consider atresia of the hymen, which separates the vagina from the vulva.

**Atresia of the Vagina.**—The common form of atresia is due to an abnormality of the hymen known as *imperforate hymen* (fig. 188). It may be due to one of two causes, a congenital defect as the result of which the hymeneal orifice fails to form in the course of development; or a vulvitis, often gonococcal, in early childhood which causes agglutination of the edges of the orifice. A rarer condition is *Atresia Vaginae* (fig. 189), in which the vagina is itself impervious in its lower third.

Atresia causes no symptoms and is as a rule unrecognised until after the onset of puberty. When menstruation commences, the menstrual

fluid cannot escape and collects in the vaginal cavity. The patient has the symptoms of menstruation, but no discharge appears. Each month the amount of fluid is increased, distending in the first instance the vagina and later the cervical canal and uterus. The tubes may also be dilated by hæmorrhage into their lumen. There are thus produced the three conditions of 'hæmatocolpos,' 'hæmatometra' and 'hæmatosalpinx'. The accumulated blood remains fluid, owing to its admixture with the alkaline mucus from the uterus and cervix, and resembles fluid tar. It may become infected with organisms, especially the *bacillus coli*, and undergo suppuration.

*Clinical Phenomena.*—As Atresia is productive of symptoms only in so far as it impedes the menstrual flow, these do not arise till puberty. Should menstruation not take place at puberty the condition may not attract attention till the patient enters married life. Cases are on record in which the accumulation of mucus has called for operative interference even in childhood. At puberty the patient experiences menstrual molimina without the appearance of a discharge. As the vaginal sac distends, pain is felt in the pelvis at first only at the periods and then more continuously. With this there is also constitutional disturbance. The periods of suffering become more protracted and the intervals of relief shorter. When the dilated vagina presses on the bladder and rectum it causes difficulty in micturition and defæcation. The abdomen swells, and this, with the amenorrhœa, sometimes causes suspicion of pregnancy. If the case is left to itself, it terminates fatally through rupture of the uterus or cervix, or of a blood-sac in the Fallopian tube, or through a simple septic peritonitis independent of rupture.

Diagnosis is easy in Atresia of the Hymen (fig. 188). A bulging swelling is visible between the labia, taking the place of the vaginal orifice; while in the rarer Atresia Vaginæ (fig. 189) no swelling is noticed on separating the labia; the fold of the hymen is seen but no vaginal canal. On rectal examination a swelling is recognised through the anterior rectal wall which is of soft, sometimes tense, consistence. If it has risen out of the pelvis so as to be felt by the hand on the abdomen, fluctuation can be elicited. The uterus may also be recognised on the upper part of the pelvic swelling, and sometimes also the dilated Fallopian tubes.

**Displacement of the Vaginal Walls Downwards.**—This has been already referred to under 'Prolapsus Uteri', in which there is a hernial protrusion of the uterus and bladder through the vulvar orifice, the protruded mass being covered by the vaginal walls and having the os externum at its apex (see figs. 35 and 37). In a case of complete prolapse *both vaginal walls* are everted with the exception of the lower inch of the posterior wall (see fig. 36). It should be noted that the rectum is not displaced, the posterior vaginal wall stripping off the

anterior rectal one. Sometimes the *anterior vaginal wall* alone prolapses, bringing with it a portion of the bladder—the condition known as ‘Cystocele’. This is not uncommon in patients about the menopause. Descent of the lower part of the *posterior wall* along with the Rectum occurs in ‘Rectocele’ (fig. 190).

*Diagnosis.*—These downward displacements can be easily recognised on inspection of the vaginal orifice. In Cystocele and Rectocele the descent of the bladder or rectum can be demonstrated by the passage of the sound into the bladder, or by the finger in the rectum.

**Fistulæ.**—The common seats of fistulæ are shown in fig. 191. The most important are those connected with the urinary tract. The *Vesico-vaginal* is the common form and arises usually as the result of labour,

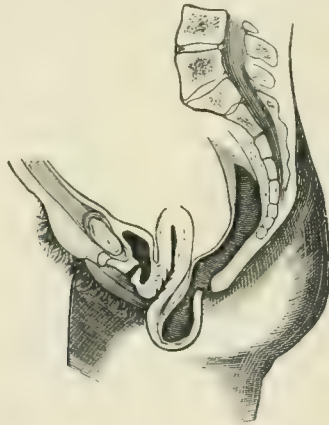


FIG. 190.—RECTOCELE.—(SCHROEDER.)

Note the protrusion of the rectum carrying the posterior vaginal wall before it.

In this case there is also a slight Cystocele.

more rarely from malignant disease (see p. 71). In connection with labour, it follows the too early or too late application of forceps. Should forceps be applied before the cervix is dilated, it may tear and the tear extend into the bladder. In such a case the urine begins to come away immediately after childbirth. On the other hand, should labour be allowed to go on too long, the prolonged compression of the bladder or urethra between the foetal head and the pubes leads to sloughing. This slough does not separate for a few days after delivery, and it is not till then that the dribbling away of urine is noticed.

*Clinical Phenomena.*—In urinary fistulæ there is constant dribbling of urine, the amount depending upon the size and position of the fistula. In slighter cases there may be control when the patient is lying down. The condition is traced back to forceps or other instrumental delivery.



A large fistula is recognised by the finger, its exact position and extent being made out by passing the sound at the same time into the bladder. For smaller fistulae the speculum is required, and it may be necessary to distend the bladder with a sterile coloured solution, the oozing of which into the vagina will show where the fistula is. When the fistula is not vaginal but vesico-uterine, the fluid exudes from the cervical canal.

The diagnosis of ureteric fistulae, in which the ureter alone has been injured, presents the greatest difficulty. In such a case the coloured solution injected into the bladder will not come away *per vaginam*.

A *Recto-vaginal* Fistula is usually the result of an extensive tear of

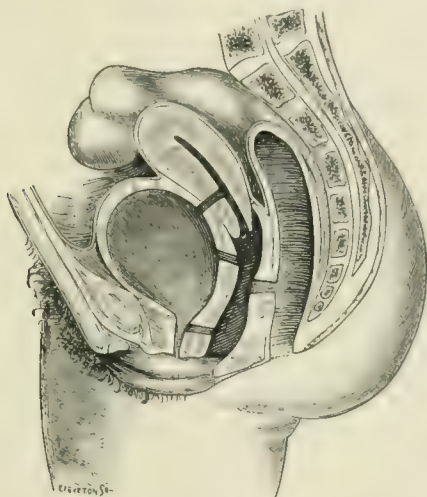


FIG. 191.—DIAGRAM REPRESENTING THE CHIEF VARIETIES OF URINARY FISTULÆ.  
—Urethro-vaginal, Vesico-vaginal, and Vesico-uterine.

The seat of a Recto-vaginal Fistula is also indicated.

the recto-vaginal septum occurring in labour; the perineal portion of the tear has united, leaving an opening in the recto-vaginal septum at the apex of the perineal body—see fig. 196, which should be compared with fig. 191. In this case the patient complains of faecal matter passing *per vaginam* when the bowels move, especially when the motions are fluid. The fistula is localised by the passage of the finger or a metallic bougie into the rectum, as in fig. 196. Recto-vaginal fistulae also occur in advanced malignant disease of the cervix.

**Vaginitis.**—Inflammation of the vagina may result from the action of various organisms; the forms most frequently met with being, in puerperal cases, the streptococcus, and apart from parturition the gonococcus. The vaginal mucosa, being covered with a squamous epithelium



resists the invasion of organisms, and as a rule the vagina is affected secondarily to the cervix or the vulva. It is only after its surface has been bathed in and softened by the muco-purulent secretions from the latter that the organisms are able to penetrate. The appearances presented are similar in the different varieties of organismal infection, and a differential diagnosis can be made only after bacteriological examination.

In a typical case the surface of the mucosa is red and inflamed. The redness may take the form of closely set points, due to congestion of the connective-tissue papillæ. The vaginal walls are swollen and painful to touch. There is an abundant muco-purulent discharge, which when examined microscopically shows, in addition to leucocytes and organisms, masses of desquamated epithelium.

When the acute stage passes off, the swelling of the walls diminishes but the granular appearance may persist and the surface feel rough on examination. The discharge becomes thinner and less purulent. Such a chronic vaginitis may persist for a long time, as the organisms lurk in the folds of mucosa; while at any time they may regain their activity and produce an acute exacerbation.

'Senile vaginitis' occurs at the menopause. The epithelium is shed in patches and the raw surfaces thus produced adhere together,—hence the cicatricial contraction of the vaginal vault often observed in elderly patients. We have referred to a similar process taking place within the uterus after the menopause (see p. 84), leading to obliteration of the genital tract.

*Clinical Phenomena.*—On vaginal examination the finger recognises the discharge, which escapes on separating the labia, and in many cases a granular condition of the mucous membrane. The speculum shows that the latter is inflamed and covered with purulent discharge; the redness is usually in the form of patches, but may be diffuse. The appearance of the cervix should be noted to ascertain that the leucorrhœal discharge does not come from it. The differential diagnosis between the simple and gonococcal vaginitis is often very difficult. The latter is marked by a sudden development of vaginitis with urinary symptoms in a patient who has had previously no leucorrhœa, protracted duration and resistance to treatment. Diagnosis is only certain on squeezing pus out of the urethra, and the detection of the gonococcus (see p. 29).

**Vaginismus: Dyspareunia.**—By Vaginismus is meant reflex contraction of the muscular fibre surrounding the vagina, as Laryngismus is applied to the same condition in the larynx. It does not arise until the patient enters married life. Dyspareunia is a more general term including all cases of painful or difficult sexual intercourse. The distinction which these terms imply cannot always be made clinically. The condition is found in some patients of a nervous or sensitive

temperament without there being any local source of irritation, but this is exceptional. Usually one of the following conditions is present: an inflamed hymen which has not been ruptured, or irritable caruncule myrtiliformes; an irritable spot in the fossa navicularis, or fissures in the fourchette or round the vaginal orifice; fissure of the anus, or urethral caruncle.

*Clinical Phenomena.*—Dyspareunia and sterility are the leading symptoms. Dyspareunia producing vaginismus does not arise till after marriage. The suffering may be so great that medical advice is at once sought; often a sense of delicacy prevents this until the condition has existed for some time. As the ordinary vaginal examination is painful, the patient involuntarily drawing away as soon as the tender spot is touched, it is necessary to make inspection of the external genitals. Here any of the above-mentioned conditions may be found. Sometimes no local cause is evident; but on carrying the finger into the vagina a reflex contraction of the levator ani is felt. Dyspareunia may be also due to some local pathological condition of the roof of the vagina, such as a prolapsed ovary or utero-sacral cellulitis.

**Tumours.**—Vaginal tumours are rare, the more common being cysts, fibroid tumour, and carcinoma. Sarcoma, secondary nodules of chorion-epithelioma, and tuberculous nodules have also been described.

*Vaginal cysts* are more frequent in the anterior vaginal wall, usually the lower third. As there are no mucous glands, the origin has been disputed. In some cases they have been traced to diverticula of the mucosa which have become shut off, or to dilated lymphatics; and they are also attributed to persistence of the canal of Gartner which passes downwards beside the vagina. They have been found continuous with a cyst between the layers of the broad ligament, which supports this origin. They are usually lined with a single layer of cylindrical epithelium, and the contents vary from thin clear to gelatinous chocolate-coloured fluid. A cyst in the anterior vaginal wall is demonstrated by passing the sound into the bladder, and finding that the cyst is between it and the vaginal finger; in the posterior wall, by combined recto-vaginal examination.

*Fibroid tumours* are more frequent in the anterior wall, consist of fibrous tissue with some unstriped muscular fibre, and are pedunculated or sessile. They are recognised by the firm character of the tumour and its well-defined outline.

*Cancer* of the vagina is extremely rare as a primary condition but not uncommon as secondary to that of the cervix. It takes the form either of a localised broad-based papillary swelling seated most frequently in the posterior vaginal wall, or a diffuse infiltration often constricting the canal in a ring-like manner. When situated low down, the inguinal glands are enlarged.

## THE PELVIC FLOOR.

Under Affections of the Vagina reference has been made to the downward displacement of its walls, along with the organs in relation to these—the uterus, bladder and rectum; and under Affections of the Vulva changes in its form, due to laceration of structures more deeply seated, will have to be mentioned. The etiological factor of these pathological conditions lies in changes in the *pelvic floor*, which therefore calls for special notice.

**Anatomy.**—Berry Hart's investigations on the 'Structural Anatomy



FIG. 192.—THE SACRAL OR SUPPORTING SEGMENT OF THE PELVIC FLOOR.—(HART.)

It comprises the structures lying behind the vagina.

*c.* Symphysis pubis : *f.* Perineum or inferior angle of sacral segment : *g.* Anus.

of the Female Pelvic Floor' first drew attention to the true cause of these displacements and their relation to childbirth. He explained how 'the female pelvic floor has been constructed so as to allow of parturition and the rectal and vesical functions and yet remain strong enough to resist ordinary intra-abdominal pressure. The question is a structural or architectural one'.

The pelvic floor, as seen in vertical mesial section (see fig. 6), he divides into two parts: that in front of the vaginal cleft—the 'pubic segment'; and that behind—the 'sacral segment'. The former comprises

the bladder with its peritoneum, the urethra, and the anterior vaginal wall; the latter the rectum, perineum, posterior vaginal wall, and strong fascial and muscular tissue. It is these latter structures (the pelvic fascia and levator ani), meeting in the perineal body and embracing the vagina, which give stability to the floor. The essential supporting part, or 'sacral segment', as seen in the middle line, is shown in fig. 192; its relations at the sides have already been referred to in speaking of the lateral relations of the vagina. 'The position and tone of the lower part of the vagina is due to a slinging movement of the levator ani muscles, the rigidity of the triangular ligament, and the firm muscular knot of the perineal body which, when intact, gives the slinging power of the levator ani fibres a point on which to act'.

**Pathological Changes.**—The passage of the foetal head in labour through the pelvic floor implies stretching of the vagina and vulva with laceration. Laceration affects chiefly the sacral segment at its lower end, *i.e.* produces a tear of the perineum. The change in appearance of the vulvar orifice, produced by childbirth, is shown in fig. 194. The tear of the perineum varies in extent—compare figs. 195 and 196. A tear always occurs, and may heal—at least as far as the skin and superficial structures are concerned. The point to be emphasised here is that the appearance of the skin surface is no indication of the condition of the pelvic floor; that is to say, that with an apparently intact perineum the levator ani and the fascia may not have united. As a result of this, in course of time, prolapse develops. The amount of lesion of the floor is diagnosed by the 'relaxation of the vaginal outlet' noted on vaginal examination. By pressure with the fingers backwards in the middle line and to the sides, we can ascertain to what extent the normal firmness of the tissues has been affected and may feel the margins of the retracted levator ani and fascia.

## AFFECTIONS OF THE VULVA.

The external genitals which surround the vulvar orifice consist of the Labia Majora with the Mons Veneris and Fourchette, the Labia Minora with the Clitoris and Vestibule. With these are included the Urethral Orifice which belongs to the urinary system, and the Hymen which separates the external genitals or vulva from the vagina.

The *Labia Majora* (fig. 193) are two folds of skin covered with hair, meeting in front over the pubes in the *Mons Veneris* and behind in the thin fold of skin in front of the perineum known as the *Fourchette*. They extend backwards parallel to the outlet of the pelvis, the direction of the vulvar orifice therefore being at right angles to that of the vaginal cavity, which is transverse.

On separating the Labia Majora, the *Labia Minora* are seen as two



delicate folds of skin starting about the middle of the inner aspect of each labium majus and passing forwards to meet in the middle line below the mons veneris. Each labium minus bifurcates at its anterior end, the posterior limb passing into the body of the Clitoris, while the anterior blends with its fellow to form the Prepuce. The *Clitoris*, the homologue of the male penis, consists of the 'glans' and the body attached to the pubes by two 'crura'. It is composed of erectile tissue,



FIG. 193.—VULVAR ORIFICE IN VIRGIN.

*a.* Labium majus; *b.* Labium minus; *c.* Vestibule with urethra below; *d.* Glans; and *e.* Prepuce of clitoris.

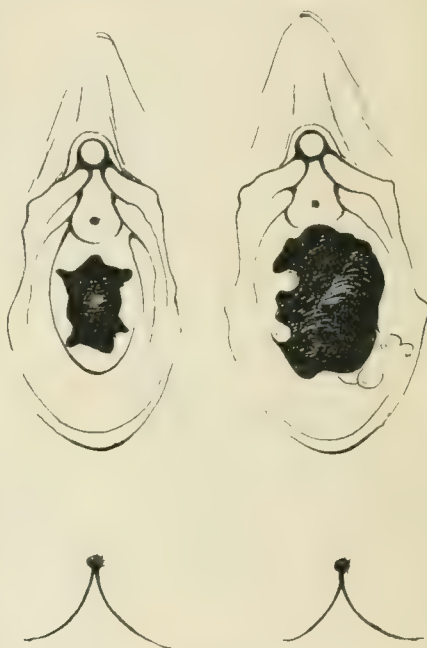


FIG. 194.—SAME IN MARRIED NULLIPARA, AND MULTIPARA.

In the latter, the remains of the hymen form the carunculae myrtiformes.

and receives its blood supply through the artery to the clitoris—a branch of the internal pudic.

The labia minora produce by their convergence a triangular area known as the *Vestibule*. This mucous membrane covers the anterior aspect of the symphysis and is smooth, contrasting with the rugose anterior vaginal wall with which it becomes continuous. In the centre of the base of the vestibule, that is, just beneath the symphysis pubis, lies the *Urethral Orifice*, while the clitoris is at the apex of the triangle.



The *Hymen* is a fold of mucous membrane which separates the vulva from the vagina. It is usually crescentic in form, being deficient anteriorly as in fig. 193; or it may surround the entire opening. The free edge of the hymen is intact in the virgin, but in the married nullipara (fig. 194) it is usually torn, sometimes only stretched, and admits two fingers without pain. After childbirth the hymen disappears as a distinct membrane, the remains of it being called the *carunculae myrtiliformes* (fig. 194).

When the fourchette is drawn back from the hymen, a small boat-shaped space is produced—the *Fossa Navicularis*. On either side of the

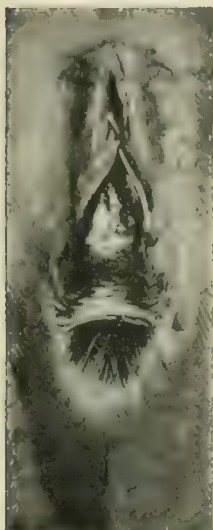


FIG. 195.—COMPLETE  
TEAR OF PERINEUM.

Note the end of the septum separating vagina and rectum, and the exposed anal canal.

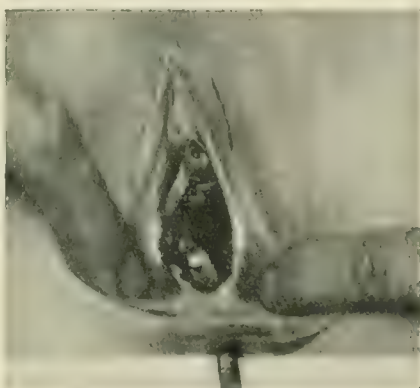


FIG. 196.—RECTO-VAGINAL TEAR,

the perineal part of which has healed, leaving a recto-vaginal fistula above, through which a bougie is passed from the rectum.

posterior third of the vaginal orifice, superficial to the triangular ligament, lies the Bartholinian Gland. It is a compound tubular gland which secretes a clear translucent fluid; and is the homologue of Cowper's glands in the male. Each has a long duct which opens laterally at the base of the hymen. Both glands and duct are lined with a tall columnar epithelium.

The appearance of the vulvar orifice varies in different conditions, as is seen in figs. 193, 194, which show the vaginal orifice in the virgin, the married nullipara, and the multipara. In the nullipara the hymen can

be traced as a continuous membrane at its base, while in the multipara the orifice is wider and only relies of the hymen are seen in the carunculae myrtiliformes. It should be borne in mind that a slight tear always occurs when a full-time fetal head passes through the vulvar orifice. It may heal, however, so well that no laceration is obvious. All degrees of perineal tear are found, up to the complete tear shown in fig. 195. Here the perineal tear has passed through the sphincter ani into the rectum. In this case the patient will complain of incontinence of flatus or faeces, especially when the motions are loose.

Sometimes the perineal portion of the tear heals (fig. 196) leaving a recto-vaginal fistula at the upper part of the perineum—as shown in fig. 191. Here also there is incontinence of flatus, and faecal matter passes *per vaginam*. Though the healing of the perineum closes the anal canal anteriorly, the sphincter may not have united.

The appearance of the vulvar orifice varies also with the age of the patient. In the child the labia minora are more prominent. In the adult, owing to the greater development of the labia majora, these come into apposition, so that to see the labia minora and hymeneal orifice the labia majora must be drawn apart. About and after the menopause, as the result of a shrinkage of the labia majora, the vaginal orifice becomes again evident.

In addition to the lacerations mentioned, the following pathological conditions call for notice: vulvitis, pruritus vulvæ, kraurosis, leucoplakia, skin eruptions, ulcerative lesions and tumours.

**Vulvitis.**—This occurs alone or in association with vaginitis. The infecting organism is usually one of the pyogenic group or the gonococcus. The condition may begin acutely or run a more or less chronic course. The symptoms and signs are much the same whatever the infecting organism be, and a differential diagnosis is made from examination of the organism. The cases of simple infection result from want of cleanliness and from contamination with discharges from higher up in the genital tract. Hence it is often secondary to vaginitis and accompanies urinary fistula and carcinoma. Protracted exercise, especially in hot weather, favours its development, and that most readily in patients with much adipose tissue. It is sometimes occasioned by awkward coitus and by masturbation. In children it is not uncommon; it is important to remember this, as the inflamed appearance of the vulva and the profuse discharge make the parents suspect the child has been violated and has contracted specific disease. It is caused by irritation of urine, want of cleanliness, and the strumous diathesis. Sometimes it is due to gonorrhœal infection through want of cleanliness, the virus being carried on the fingers or towels or chamber utensils.

In a gonococcal infection, there is usually a definite history of sudden onset. The first symptom is a feeling of scalding in the region of the

urethral orifice. This is followed by swelling of the labia and discomfort in walking. There is a free purulent discharge. On examination at this stage the labia majora are œdematous and moist. The labia minora may be greatly swollen and almost translucent in appearance. The vestibule and the orifice of the urethra are injected and all the parts are covered with purulent discharge. As the acute stage passes off, the discharge becomes thinner and less abundant. The œdema diminishes, but does not entirely disappear for a considerable time. As a rule there is infection of the urethral mucous membrane, so that pus can be squeezed out at the orifice when the urethra is compressed from above downwards by the finger in the vagina.

*Abscess of the Bartholinian gland* is a common complication of gonococcal vulvitis, though it also arises from suppuration of a simple



FIG. 197.—ABSCESS OF THE BARTHOLINIAN GLAND.

cyst. The condition may be uni- or bi-lateral. The infection extends along the duct of the gland; as the result of the inflammation, the orifice becomes occluded and an abscess forms. It is usually superficial, producing a swelling on the inner aspect of the labium majus in its posterior third (fig. 197), intensely painful, especially on walking and sitting. The diagnosis is made from the situation of the swelling, from the intense pain which it produces, from the redness and œdema over it, and from the fluctuation.

**Pruritus Vulvæ.**—This irritable condition of the external genitals is a symptom rather than a disease, though there may be certain changes in the nerve endings (fibrosis) forming a distinct pathological condition. It is produced by any irritating discharge from the vagina as in carcinoma, senile vaginitis, or even simple leucorrhœa. It occurs in diabetes—due to irritation from the sugar in the urine—and in other affections of the kidneys and bladder. It is also caused by whatever produces congestion

of the labia—hence its occurrence at the menstrual period and in pregnancy; by irritable skin affections, as herpes and eczema; and by pediculi. The irritation is not continuous but recurs periodically. In some cases it appears only after taking a long walk or getting warm in bed. The irritability is slight at first but becomes aggravated by scratching. To obtain this temporary relief the patient avoids company, and this, with the constant irritation, may lead to nervous depression.

For diagnosis of the case, a thorough examination is necessary: careful inspection of the external genitals for irritating skin eruptions, with microscopic examination if necessary for parasites; examination of the vagina and cervix with speculum for the source of discharge high up in the genital tract; and especially testing the urine for sugar or albumen.

**Kraurosis.**—This is a condition in which the tissues round about the vaginal orifice undergo atrophy resulting in a stenosis. The parts affected are the labia minora, the vestibule, the orifice of the urethra and vagina, and sometimes the clitoris. The outer surfaces of the labia majora are never affected. The condition is met with (1) in young sterile women; (2) at or after the menopause; and (3) after removal of the ovaries. The first manifestation is the appearance of red shiny patches round the orifice of the vagina, varying in size from a pin-head to a split-pea. They are intensely painful to touch and are often associated with another painful condition, a caruncle of the urethra. After these patches have been present for some time all the tissues become atrophied and contracted, so that the labia minora and clitoris practically disappear and the vaginal orifice becomes almost occluded. Microscopic examination of the patches shows a thinning of the epithelium and great proliferation of the plasma cells underneath. In the last stage the epithelium is everywhere very thin, and the papillæ and intrapapillary processes have practically disappeared.

The symptoms in the first stage are great pain and tenderness, dysuria and dyspareunia. In the second stage, after the disappearance of the red areas, the pain and tenderness disappear, but the shrinking results in a continuation of the dyspareunia.

**Leucoplakia.**—Attention was directed to this condition by Butlin and more recently by Barclay and Bonney, whose description we shall follow. The disease is of importance, as it is frequently the precursor of carcinoma of the vulva. It runs a definite course, beginning as an inflammatory condition with hyperæmia and cellular activity. This is followed by a sclerosis of the sub-epithelial tissues and epithelial hypertrophy. The parts affected are the vulva, the inner aspects of the thighs, and the skin of the perineum and round the anus. The vestibule and the orifice of the urethra are never affected.

In the first stage the parts are swollen, reddened, excoriated and dry. Microscopically there is found to be congestion of the sub-epithelial tissue



and invasion of lymphocytes. The epithelium is swollen, and there is excessive desquamation. In the second stage the labia minora become shrunken, and patches of a white colour and opaque appearance are seen. These patches under the microscope show great epithelial hypertrophy in the basal layers, with excessive desquamation on the surface. Groups of plasma cells and large connective-tissue cells are present in the sub-epithelial tissue. The elastic fibres disappear and the white fibres become more hyaline. In the third stage, cracks and ulcers form on the surface, from which discharge and blood may come. These cracks and ulcers result from the excessive desquamation exposing the tips of the underlying papillae. Epithelial overgrowth is still going on in the deep layers, and at this stage carcinoma is very apt to develop. In the fourth stage, if the patient escapes carcinoma, an excessive atrophy of the tissues occurs, so that the labia minora and clitoris practically disappear, whilst the skin of the mons veneris and labia majora becomes tightly stretched. At this stage there is dense sclerosis of the sub-epithelial tissues, whilst the epithelium itself is much thinner than normal.

There is practically only one symptom, namely, pruritus, which is worst during the first and second stages. When cracking and ulceration occur there may be considerable pain and tenderness. Carcinomatous ulcers are always exceedingly painful. In the fourth stage all symptoms cease. The importance of the condition, apart from the very troublesome symptom of pruritus which accompanies it, lies in its association with the development of cancer. The relationship between the two appears to be the same as in the corresponding conditions in the tongue.

*Vulvar Warts.*—The most common type of wart in this region is the so-called venereal wart. At one time it was thought to be due to a gonococcal infection. We now know that whilst it is contagious it has nothing to do with the gonococcus. These warts are usually multiple, with somewhat narrow neck and a tufted appearance. If not treated they may attain a large size, forming huge masses in this region.

Microscopically they present the ordinary appearances of a papilloma. Fig. 198 is a section of such a wart, and it is seen to be composed of a connective-tissue basis with papillary projections and a covering of stratified squamous epithelium. They must not be confused with syphilitic condylomata, which are moist, flat plaques.

*Eruptions of the Vulva.*—The skin round the vulvar orifice may be affected with any of the eruptions found on other parts of the body. Of these the most important are erysipelas, eczema, prurigo, herpes, acne.

*Ulcerative Lesions of the Vulva*—*Lupoid, Syphilitic, Tuberculous.* Under this head we include a variety of conditions which used to be described under the term 'Lupus'. Of these some may be true lupus, but others are syphilitic, tuberculous, or due to other micro-organisms. Some cases described as lupus are undoubtedly syphilitic. The section in



fig. 199 was taken from a case in which there was ulceration of the vulva extending gradually over many years; which proved ultimately to be 'ulcus serpiginosum'. It shows the large nucleated round cells. The methyl-blue stain brought out, here and there, small bacilli, though less abundant than in the cases described by Unna.

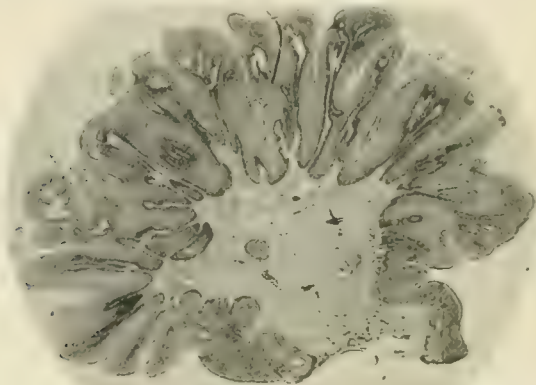


FIG. 198.—'VENEREAL' WART.  
Of the nature of a simple papilloma.

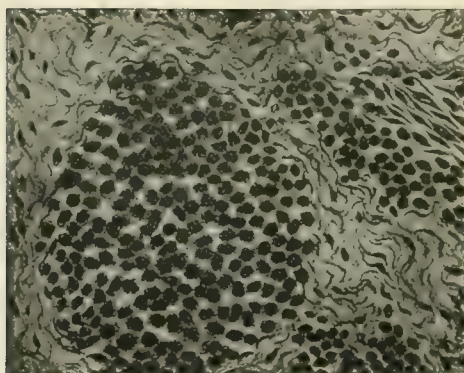


FIG. 199.—ULCUS SERPIGINOSUM OF VULVA.

Other cases are associated with tuberculosis. Besides the syphilitic and tuberculous, there has been described recently by Dupuy and Rullier a rare form for which the term 'esthiomène', introduced by Huguier, should be retained. It consists of induration, associated with ulceration, extending gradually and sometimes healing, causing destruction of the vulva and anterior and posterior vaginal walls.

*Elephantiasis* need only be mentioned, as it is an extremely rare condition except among the coloured races. It may affect the clitoris, the labia minora, or the labia majora, and extend to the perineum. It is apparently due to a chronic inflammation leading to obstruction of the lymphatics, and syphilis is said to be a common exciting cause.

**Tumours.**—Of these the most frequent is the *Bartholinian Cyst*. When the duct of the Bartholinian gland becomes obstructed, a retention cyst forms. The tumour is similar to what has been described under Abscess of the Gland (see fig. 197), except that there is no inflammation of the tissues around. Other simple but rare tumours are a *fibroid* and *lipoma*.

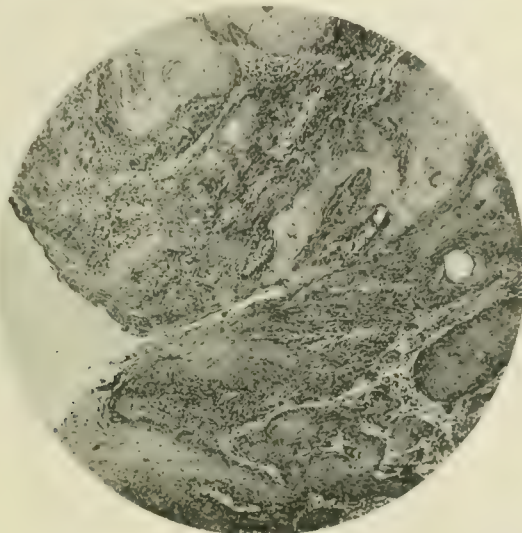


FIG. 200.—CANCER OF THE VULVA.

A squamous epithelioma. Note the cell-nests.

*Cancer of the Vulva.*—The type of carcinoma which develops in the vulvar region is the squamous epithelium. It usually occurs towards the anterior aspect of the vulva, involving the labium majus, the clitoris, and the parts in the neighbourhood. The growth early takes on an ulcerated character, and the ulcer presents the typical appearances, with hard, indurated edges and irregular, hard, sloughing base. The microscopic appearances are shown in fig. 200. The epithelium extends down into the connective tissue in the form of solid plugs, and cell-nests are present. The disease extends by the lymphatics to the superficial inguinal glands which in some cases become early involved. If the cancer is distinctly unilateral, only the glands of the corresponding side may be involved. Frequently, however, the opposite inguinal glands are also affected owing

to the crossing of the lymphatics at the middle line. If untreated, these glands also ulcerate and death occurs as the result of the local affection and of a general cancerous cachexia. As we have already stated, cancer development may occur in the course of a leucoplakic vulvitis, in which case the cancerous infiltration may be more diffuse or may arise at several different points.

Clinically the characteristic of the cancerous ulcer of the vulva is the

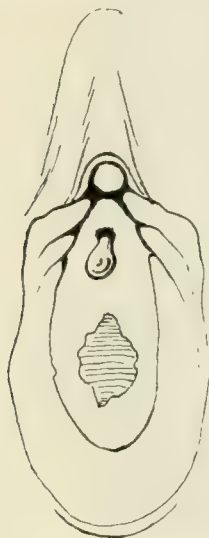


FIG. 201.—URETHRAL CARUNCLE.

Note the small growth at the urethral orifice.

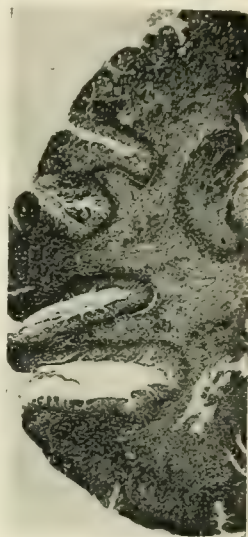


FIG. 202.—MICROSCOPIC SECTION OF SAME.

The stroma is very vascular—note the dilated vessels. The epithelial covering is in several layers—so-called transitional epithelium.

sharp shooting pain which it causes. This directs the patient's attention early to the condition.

Along with the tumours of the vulva may be mentioned the *Urethral Caruncle*, a fairly frequent condition at the urethral orifice. It takes the form of a bright red tumour usually no larger than a pea (fig. 201). Microscopic section shows it to be a simple papilloma (fig. 202). It is excessively sensitive and causes pain on micturition and sometimes on walking, and also dyspareunia. It tends to recur after removal.

# INDEX

*Note.*—The page where the subject is fully discussed is indicated by the darker figure.

- ABDOMEN**, examination of, **7**  
 contour of, in fibroids, 9, 116  
   ovarian tumours, 8, 170  
 relation to pelvis, 14
- Abdominal pressure and position of uterus**,  
 42  
 tumours, diagnosis of, 172
- Abortion**, 7  
 and cellulitis, 182  
   endometritis, 84, 88  
   fibroids, 114  
   fibrosis uteri, 92  
   peritonitis, 182  
   retroversion, 48  
   chorionic villi after, 93  
   diagnosis of, 27  
   incomplete, and curettage, 93  
   tubal, 143, 147
- Acne of vulva**, 209
- Adeno-carcinoma of cervix**, 66, **68**  
   endometrium, 96
- Adenoma**, malignant, of endometrium,  
 96
- Adeno-myoma**, **111**
- Age in relation to cancer**, 73  
   fibroids, 113  
   ovarian tumours, 169
- Amenorrhœa**, **6**  
   in atresia of vagina, 197  
   tubal gestation, 146
- Ampulla of tube**, 127, 129
- Anæmia in cervical catarrh**, 63  
   endometritis, 88
- Anæsthesia in examination**, 20
- Anteflexion**, 42, **43**  
   acquired, **44**, 189  
   congenital, **43**
- Anteversion**, 42  
   and chronic metritis, 92
- Appendicitis**, 8  
   and pelvic peritonitis, 184  
   right-sided salpingitis, 133
- Ascites**, diagnosis of, 10  
   and fibroid of ovary, 166
- Ascites and papilloma**, 164  
   endothelioma, 167  
   malignant tumours, 173  
   parovarian cyst, 180
- Atresia of hymen**, 196, 197  
   vagina, 196
- Atrophy of fibroids**, 117  
   uterine appendages, 187  
   uterus, 187  
     congenital, 40  
     puerperal, 40
- Auscultation**, **11**, 117, 171
- BACILLUS COLI** infection in endometritis, 84  
   in fibroids, 121  
     ovarian cysts, 177  
     pelvic peritonitis, 183  
     pyosalpinx, 133  
     salpingitis, 129, 130
- Bacteriological investigation**, **28**
- Barclay on leucoplakia**, 208
- Bartholinian cyst**, 211
- Bartholinian gland**, 205  
   abscess of, 207  
   in gonococcal vulvitis, 207
- Bicornuous uterus**, 38
- Bimanual examination**, 13, **14**, 17  
   in cirrhotic ovary, 160  
     cystic ovary, 159  
     fibroids, 116  
     fibrosis uteri, 92  
     ovarian tumour, 170  
     retained products, 94  
     retroversion, 47  
     tuberculous salpingitis, 138  
     utero-sacral cellulitis, 190  
   with sound, 25
- Bladder**, position of, 15, 17, 195  
   and ovarian tumours, 171, 172  
     position of uterus, 36  
   distended, 20, 37, 171  
   in prolapse, 50  
   retroflexion, 47

- Bladder symptoms in fibroid tumours,  
111, 114  
tuberculous sal-  
pingitis, 138  
uterine lesions,  
5, 88
- Bonney on leucoplakia, 208
- Broad ligament cysts, **177**
- Broad ligaments, 17, 182, 184  
in fibroids, 114  
tuberculous invasion of, 136, 137
- Butlin on leucoplakia, 208
- CALCIFICATION** of fibroids, 118
- Calculus, diagnosis of, 195
- Cancer and age, 74  
menopause, 99  
diagnosis of, 63, 75, 76  
early diagnosis and operation, 73  
etiology, 73  
frequency in body of uterus and cervix,  
98  
mode of extension, 71  
origin of, 56, 65  
rectal examination in, 22
- Carcinoma of body of uterus, **96**  
cervix, **65**  
ovary, 167,  
tube, 149  
vagina, 201  
vulva, 211  
and leucoplakia, 208, 209, 212
- Carcinomatous degeneration, 169
- Carunculae myrtiformes, 205, 206
- Case-taking, method of, **3**
- Catheter. uterine. 27
- Cellular tissue and cervix, 54
- Cellulitis, **182**  
diagnosed per rectum, 21  
and ovarian tumour, 172  
utero-sacral, **189**
- Cervical catarrh and laceration, 58  
diagnosis from cancer, 63  
erosion, 59  
glands, 56  
secretion, 56
- Cervix, adeno-carcinoma of, **66, 68**  
affections of, **63**  
after abortion, 94  
anatomy of, **53**  
cancer of, **65**  
catarrh of, **69**  
columnar-celled carcinoma of, **66, 68**  
dilatation of, 25  
epithelioma of, **66**  
fibroid of, 65
- Cervix, hypertrophy of, **57**  
in prolapse, 50  
retroversion, **46**  
laceration of, **57**  
position of, 15  
sarcoma of, 65, 125  
tumours of, **57, 63**
- Childbirth and cellulitis, 182  
endometritis, 84  
peritonitis, 182  
vesico-vaginal fistulae, 198
- Chorionepithelioma, **94, 101**  
and abortion, 104  
diagnosis of, 83  
and hydatid mole, 101, 104  
pregnancy, 104  
puerperium, 101  
syncytium, 103  
uterine hæmorrhage in, 104
- Chorionic villi after abortion, 93  
in tubal gestation, 142
- Chronic metritis (see Fibrosis uteri)
- Cirrhotic ovary, **159**  
and fibrosis of uterus, 160  
reproduction, 160
- Clitoris, 204
- Columnar-celled carcinoma of cervix, 66
- Conception, retained products of, 93
- Constipation, 5  
in gynecological disease, 6, 88
- Corpus albicans in ovary, 156
- Corpus luteum, **154**  
and chorionepithelioma, 101  
internal secretion, 152  
lutein cysts, 157
- Curettage, diagnostic, **25, 30**  
in cancer, 99  
chorionepithelioma, 104  
endometritis, 86  
fibrosis uteri, 91  
incomplete abortion, 93  
sarcoma, 126  
tuberculous endometritis, 96
- Curette, 27
- Cystic degeneration of fibroids, 119
- Cystic ovary, 152  
and chronic salpingitis, 132  
origin of, 181
- Cystocele, 198
- DECIDUA, 82**  
and uterus, 56  
in tubal gestation, 142
- Deciduoma malignum, **101**
- Degeneration, malignant, in ovarian tumours, 174
- Degenerative changes in fibroids, 117



- Dermoid ovarian cyst, 164**  
 contents of, 165  
 malignant change, 165  
 origin of, 166, 181  
 suppuration, 165  
 teratoma, 165  
 torsion of pedicle, 165
- Diabetes in pruritus, 207**
- Dilatation of cervix, 25**
- Dilators, uterine, 26**
- Displacement, downwards, of vaginal walls, 197**  
 of uterus, 40
- Doderlein on vaginal secretions, 194**
- Doran on carcinoma of Fallopian tube, 149**
- Ducts of Müller, 196**
- Dupuy on esthiomène, 210**
- Dysmenorrhœa, 6**  
 in antelexion, 44  
 cystic ovary, 158  
 endometritis, 88  
 retroversion, 48  
 membranous, 80
- Dyspareunia, 200**  
 in kraurosis, 208  
 prolapsed ovary, 201  
 urethral caruncle, 212  
 utero-sacral cellulitis, 201
- Dyspepsia in endometritis, 88**  
 cervical catarrh, 63
- ECZEMA of vulva, 208, 209**
- Elephantiasis, 211**
- Emmet's operation, 58**
- Endometritis, acute, 84**  
 chronic, 85  
 glandular, 85  
 hæmorrhagic, 87  
 hyperplastic, 87  
 interstitial, 91  
 villous, 88
- Endometrium, adeno-carcinoma of, 96**  
 columnar-celled carcinoma of, 96  
 changes in pregnancy, 82  
 after menopause, 83  
 glandular hyperplasia of, 85  
 histology of, 77  
 malignant adenoma of, 96  
 menstrual changes in, 80, 81  
 pathology of, 84  
 tubercle of, 95
- Endothelioma of ovary, 166**  
 uterus, 124
- Epithelioma, squamous, of cervix, 66**
- Epoophoron, 181**
- Erysipelas of vulva, 209**
- Examination, abdominal, in ovarian tumours, 175**  
 bacteriological, 28  
 bimanual, 17  
 and sound, 25  
 of abdomen, 7  
 pelvis, 11  
 the blood, 28  
 histological, 30  
 microscopic of tissues, 28, 31  
 rectal, 11, 20  
 recto-vaginal, 20  
 under anaesthesia, 20  
 vaginal, 11  
 with speculum, 22, 23  
 sound, 22
- External genitals, 203**  
 inspection of, 11
- Extra-uterine gestation, 138, 191**
- FALLOPIAN tube, affections of, 127**  
 anatomy of, 127  
 inflammation of, salpingitis, 129  
 position of, 16, 17, 127  
 tumours of, 149
- Fibro-adenomatous polyp, 65**
- Fibroid tumours of uterus, 9, 104**  
 adeno-myoma, 111  
 carcinomatous degeneration in, 96, 122  
 fibrous polypus, 105  
 interstitial, 105  
 necrobiosis in, 120  
 sarcomatous degeneration in, 121  
 sub-mucous, 105  
 sub-peritoneal, 105
- Fibroid tumours of vagina, 201**  
 vulva, 211
- Fibroma of ovary, 166**
- Fibro-myoma of uterus, 104**
- Fibrosis uteri, chronic metritis, 89**
- Fistula, recto-vaginal, 199, 206**
- Fistulæ in cancer of cervix, 71**  
 ureteric, 199  
 vesico-uterine, 199  
 vesico-vaginal, 198
- Fœtid discharge in cancer of cervix, 75**  
 endometrium, 99  
 retained products, 94  
 sarcoma, 126
- Forceps and fistulæ, 198**
- Fossa navicularis, 205**
- GARTNERIAN cysts, 181, 182**
- Gartner's canal, 177, 201**  
 and adeno-myoma, 113

- Glands, affection of, in cancer of cervix, 71, 73
- Gonococcus, detection of, **29**  
     in pelvic peritonitis, 183  
     salpingitis, 129, 130  
     vaginitis, 199  
     vulvitis, 206
- Gonorrhœal infection in cervical catarrh, 54  
     endometritis, 84  
     salpingitis, 130  
     vulvitis, 206
- Gynecological diseases, origin of, 4  
     symptoms of, 4
- HÆMATOCELE**, pelvic, **190**
- Hæmatocolpos, 197
- Hæmatometra, 197
- Hæmato-salpinx, 149  
     in atresia, 197
- Hæmorrhage in gynecological diseases, **5**  
     cancer of cervix, 75  
         body, 99  
     cervical catarrh, 63  
     chorionepithelioma, 104  
     endometritis, 88  
     fibroid tumours, 114, 116  
     fibrosis uteri, 92  
     mucous polypi, 65  
     retained products, 94  
     sarcoma, 126  
     tubal gestation, 145  
     internal, at menstrual period, 192
- Hart, Berry, on pelvic floor, 40  
     sacro-pubic hernia, 49  
     structural anatomy of pelvic floor, 202
- Haultain on tubal gestation, 142
- Herpes of vulva, 208, 209
- Histological examination, 30
- Huguier on esthiomène, 210
- Hyaline degeneration of fibroids, 118
- Hydatid of Morgagni, 181
- Hydatid mole and chorionepithelioma, 101, 104  
     lutein cysts, 101
- Hydramnios and ovarian cyst, 173
- Hydronephrosis and cancer, 71  
     ovarian cyst, 173
- Hydrosalpinx simulating broad ligament cyst, 179
- Hymen, 203, 205  
     atresia of, 196  
     imperforate, 196
- Hyperæsthesia, 10
- INFANTILE** uterus, 39
- Infundibulo-pelvic ligament, 17, 127, 150
- Infundibulum of tube, 127
- Intra-abdominal pressure and position of uterus, 40  
     prolapse, 49
- Inversion of uterus, 42, **52**  
     fatty degeneration of uterine muscle in, 53
- Involution in puerperium, 47
- Isthmus of tube, 127
- KEITH** on parovarian cysts, 177, 182
- Kidney, floating, 8, 10  
     palpation of, 10
- Kobelt's tubules, 181, 182
- Kraurosis, 208
- Krönig on vaginal secretions, 195
- LABIA** majora, 203  
     minora, 203
- Laboratory investigation, **28**
- Lacerations of cervix, single, 58  
     multiple, or stellate, 58  
     pelvic floor, 203  
     perineum, 206
- Langhans' layer, 82, 101, 102
- Leucoplakia, 208
- Leucorrhœa, **5**  
     in cancer of endometrium, 99  
     cervical catarrh, 5, 63  
     endometritis, 5, 88  
     fibrosis uteri, 92  
     mucous polypi, 65  
     prolapse, 51  
     retroversion, 48  
     sarcoma, 126  
     vaginitis, 200  
     microscopic examination of, 28
- Levator ani, 184, 192, 203
- Lipoma of vulva, 211
- Liver, tumours of, 173
- Lorrain Smith on red degeneration of fibroids, 120
- Lupus of vulva, 209
- Lutein cells, 155  
     cysts, 157  
     and hydatid mole, 101
- Lymphatics in cancer of cervix, 71
- MALFORMATIONS** of uterus, **38**  
     vagina, 196
- Menge on vaginal secretions, 195
- Menopause and cancer, 99  
     cystocele, 198  
     fibroid tumours, 114

- Menopause, uterine mucous membrane  
after, 83  
uterus after, 39, 83
- Menorrhagia, 6  
in carcinoma of endometrium, 99  
cystic ovary, 159  
cirrhotic ovary, 160  
endometritis, 88, 89  
fibroids, 6, 108  
prolapse, 51  
retroversion, 48  
tubercle of the endometrium, 96  
tuberculous salpingitis, 137
- Menstruation, changes in uterus, 80  
disturbances of, 6  
normal, 6  
relation to cellulitis, 182  
peritonitis, 182  
symptoms of, in atresia, 197
- Metritis, chronic, 89  
and anteversion, 92
- Metrorrhagia, 5  
in carcinoma of endometrium, 99
- Microscope in diagnosis of abortion, 93  
cancer, 76, 97  
chorionepithelioma, 102  
endometritis 85, 86  
gonorrhœa, 29  
sarcoma, 123  
tubercle, 95
- Microscope in gynecology, 28
- Microscopic examination of tissues, 31
- Micturition, painful, 5, 88, 111, 206, 212
- Mons veneris, 204
- Morgagni, hydatid of, 181
- Mucoid degeneration in fibroids, 118, 166
- Mucous membrane of body of uterus (*see* Endometrium)
- Mucous polypi, 64, 65
- Müller, ducts of, 182, 196
- Multilocular ovarian cyst, 161
- Myxomatous degeneration of fibroids, 118
- NABOTHIAN follicle, 61, 62, 63
- OMENTUM, tumours of, 173
- Oöphoron, 181
- Os externum, 36  
and speculum, 54  
in cervical catarrh, 59  
microscopic characters, 55
- Os internum, 35
- Ovarian cysts, origin of, 181
- Ovarian hydrocele, 181
- Ovarian tumours, 8, 161  
and age, 169  
carcinoma, 167  
complications of, 173  
dermoid, 164  
diagnosis of, 10, 169  
differential diagnosis of, 171  
endothelioma, 166  
fibroma, 166  
multilocular, 161  
papillomatous, 163  
rupture of, 173, 175  
sarcoma, 166  
suppuration in, 174, 175, 177  
symptoms of, 169  
torsion of pedicle, 174, 175
- Ovario-pelvic ligament, 17, 127, 150
- Ovariectomy, Ward records of, 173
- Ovary, 127  
affections of, 150  
anatomy and histology of, 150  
cirrhotic, 159  
and fibrosis of uterus, 160  
cystic, 152, 158  
production of, 156  
inflammation of, 151  
in inversion, 52  
prolapse, 51  
retroflexion, 47  
physiology of, 151  
position of, 16, 17, 151  
prolapse of, 152  
tumours of, 161
- PAIN in atresia of vagina, 197  
Bartholinian abscess, 207  
cancer of cervix, 75  
cancerous ulcer of vulva, 212  
carcinoma of endometrium, 99  
cirrhotic ovary, 160  
cystic ovary, 159  
endometritis, 88, 89  
fibrosis uteri, 92  
gynecological diseases, 4  
kraurosis, 208  
peritonitis and cellulitis, 188  
retroversion, 47  
sarcoma, 126  
tuberculous salpingitis, 137  
utero-sacral cellulitis, 190
- Papilloma in parovarian cyst, 179  
of tube, 149  
ovary, 152
- Papillomatous ovarian cyst, 163  
and ascites, 164

- Papillomatous ovarian cyst, contents of,**  
 163  
 malignancy, 169  
 origin of, 181
- Para-metritis,** 182
- Para-metritis atrophicans,** 187
- Paroophoron,** 181
- Parovarian cysts,** 173, 177-78  
 contrasted with ovarian, 177, 180  
 origin of, 181  
 with twisted pedicle, 180
- Parovarium,** 127, 177
- Pedicle, torsion of, in dermoids,** 165  
 fibroid of ovary, 166  
 ovarian cysts, 174  
 parovarian cysts, 180
- Pelvic abscess,** 184, 187
- Pelvic cellulitis,** 187
- Pelvic floor, anatomy of,** 202  
 and prolapse, 49  
 lesions of, 203
- Pelvic hæmatocele,** 144, 148, 190
- Pelvic hæmatoma,** 144
- Pelvic peritonitis,** 183
- Pelvis, examination of,** 11  
 relation to abdomen, 14  
 sections of, 15, 16, 183
- Peri-metritis,** 182
- Perineum, anatomy of,** 203  
 tear of, 203, 205
- Perithelioma of uterus,** 124
- Peritoneum and cellular tissue, anatomy of,** 182
- Peritoneum, relations of,** 15, 17  
 in inversion, 52  
 prolapse, 49  
 retroversion, 46  
 malignant affection of, 185
- Peritonitis,** 182  
 and ovarian tumour, 172  
 retroversion, 45  
 salpingitis, 130  
 diagnosed per rectum, 21  
 pneumococcal, 129  
 tuberculous, 134, 137, 185
- Pneumococcus in peritonitis,** 129
- Poirier on lymphatics and lymphatic glands,** 72
- Polypus, examination for,** 26  
 fibrous, 106  
 mucous, 65
- Pouch of Douglas,** 15, 17, 182, 183, 185
- Pregnancy and chorionepithelioma,** 104  
 necrobiosis of fibroids, 121  
 tubal, 138
- Pressure symptoms in fibroids,** 114
- Prolapse of uterus,** 42, 48
- Prurigo of vulva,** 209
- Pruritus vulvæ,** 207
- Puerperium,** 7  
 inquiry into, 7  
 necrobiosis of fibroids in, 121  
 pelvic cellulitis in, 187  
 peritonitis in, 187
- Pyometra,** 99
- Pyonephrosis and cancer,** 71
- Pyosalpinx,** 132
- RECTAL examination,** 20, 21
- Rectocele,** 198
- Recto-vaginal examination,** 20, 195  
 in ovarian tumours, 171  
 pelvic peritonitis, 184  
 prolapsed ovary, 152  
 utero-sacral cellulitis, 190
- Recto-vaginal fistulæ,** 71, 199, 206
- Rectum, relations of,** 15, 17, 195  
 distended, 20, 171
- Red degeneration in fibroids,** 120
- Renal tumours,** 10
- Reproduction as etiological factor,** 4, 7
- Retention of products of conception,** 93
- Retroflexion,** 42, 45  
 congenital, 45
- Retroversion,** 42, 45  
 and adhesions, 45  
 endometritis, 88  
 prolapse, 51  
 puerperium, 46  
 of gravid uterus, 43
- Round ligaments,** 17, 40, 46  
 and fibroids, 114
- Rudimentary uterus,** 38
- Rullier on esthiomène,** 210
- SALPINGITIS,** 129  
 and cystic ovaries, 132  
 peritonitis, 130  
 chronic, 132  
 right-sided, and appendicitis, 133
- Sanger on deciduoma malignum,** 101
- Sarcoma of cervix,** 125  
 ovary, 166  
 uterus, 123
- Septate uterus,** 38
- Shaw on red degeneration of fibroids,** 120
- Simpson, Sir Alexander, on sound with bimanual,** 25
- Simpson, Sir J. Y., on sound,** 22  
 superinvolution, 41
- Sims' position,** 23
- Sound, uterine,** 22  
 examination by, 22

Sound in diagnosis of fibroids, 116  
 endometritis, 89  
 prolapse, 50  
 retroversion, 24, 47

Speculum, Fergusson's, 22  
 Sims', 22  
 and laceration, 58  
 sound, 22  
 urinary fistula, 199  
 vaginitis, 200  
 in cervical catarrh, 22, 63  
 fistula, 22  
 operations, 22  
 vaginitis, 22

Spleen, tumours of, 173

Staphylococcus in endometritis, 84  
 ovarian cysts, 177  
 pelvic peritonitis, 183  
 salpingitis, 129, 130

Sterility and antelexion, 44  
 endometritis, 88  
 fibroids, 114  
 fibrosis uteri, 92  
 retroversion, 48  
 vaginismus, 201

Streptococcus in endometritis, 84  
 ovarian cysts, 177  
 pelvic peritonitis, 183  
 vaginitis, 199

Superinvolution of uterus, 40

Synectium, 82  
 and chorionepithelioma, 101, 103

TEACHER on deciduoma malignum, 103

Telangiectatic fibroid, 120

Torsion of pedicle, in dermoid of ovary, 165  
 fibroid of ovary, 166  
 ovarian cyst, 174  
 parovarian cyst, 180

Trophoblast, 101, 140

Tubal abortion, 143, 147  
 gestation, 138  
 amenorrhœa in, 146  
 causes of, 139  
 changes in tube and uterus, 142  
 chorionic villi in, 142  
 course of, 142  
 decidua in, 142  
 diagnosis of, 147  
 dysmenorrhœa in, 146  
 engrafting of ovum in tube, 140  
 hæmorrhage in, 145  
 mole, 143  
 pelvic hæmatocele, 144, 148  
 hæmatoma, 144  
 symptoms of, 146

Tubercle of endometrium, 95

Tuberculous peritonitis, 185  
 salpingitis, 129, 134, 137

ULCUS SERPIGINOSUM, 210

Uma on ulcer serpiginosum, 210

Uma-Pappenheim staining method, 31

Uræmia and cancer, 71

Ureter in cancer, 71, 72  
 fistula of, 199  
 position of, 185

Urethra, fistula of, 199  
 position of, 15, 195, 196  
 pressure on, by fibroid, 114  
 in prolapse, 48

Urethral caruncle, 212  
 orifice, 203, 204

Urinary fistula, 198  
 symptoms, 5  
 in fibroids of uterus, 111, 114  
 uterine lesions, 5, 88

Uterine appendages, atrophy of, 187  
 inflammation of, 132  
 catheter, 27  
 conditions and ovarian tumours, 171  
 dilators, 25, 26, 27  
 glands, histology of, 85  
 in fibrosis uteri, 91  
 mucosa, changes in, in fibroids, 116  
 scrapings (see Curettage)  
 souffle, 11, 108, 117

Utero-sacral cellulitis, 189  
 and antelexion, 44  
 ligaments, 17, 40, 42, 44, 45, 183, 190

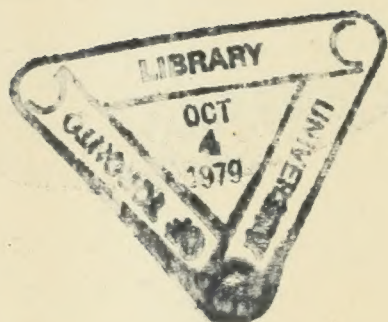
Utero-vesical pouch, 15, 182

Uterus, anatomy of, 35, 53, 77  
 atrophy of, 187  
 bicornuous, 38  
 bimanual grasp of, 15, 19  
 cancer of, 65, 96  
 changes in, in tubal gestation, 142  
 congenital atrophy of, 40  
 displacements of, 40  
 examined by finger, 27  
 fibroid tumours of, 104  
 fibrosis of, 39  
 form of, 35  
 glandular hyperplasia of, 85  
 infantile, 39  
 inflammation of, 84  
 inversion of, 52  
 ligaments of, 17, 40, 182  
 malformations of, 38  
 position of, 15, 17, 36, 40, 42  
 prolapse of, 42, 48  
 puerperal atrophy of, 40



- Uterus, retroposition of, 42  
 rudimentary, 38  
 sarcoma of, **123**  
 septate, 38  
 size of, 24, **36**, 37  
 superinvolution of, **40**  
 supports of, 40
- VAGINA, affections of, **192**  
 anatomy of, 192  
 atresia of, 196  
 cancer of, 201  
 malformations of, 196  
 position of, 15  
 relations of, 195
- Vaginal bacillus, 194  
 cysts, 201  
 discharges, 5  
 examination, **11**, 13  
 fornices, 13, 15
- Vaginismus, 193, 200
- Vaginitis, 193, 199  
 senile, 200
- Van Gieson's method of staining, 92, 108
- Venereal wart, 209
- Vesico-vaginal fistula, 71
- Vestibule, 204
- Volzella, 26, 170  
 in diagnosis of fibroid tumours, 117  
 laceration, 59
- Von Pirquet's tuberculin skin reaction, 138
- Vulva, affections of, **203**  
 cancer of, 211  
 eruptions of, 209  
 tumours of, 211  
 ulcerative lesions of, 209  
 vulvar warts, 209  
 vulvitis in children, 206
- WERTHEIM's operation, 73
- Wolffian body, 177, 181





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